

**STARDUST**

**MISSION PLAN**

**POST LAUNCH  
SUPPLEMENT A**

**December 8, 1999**

Jet Propulsion Laboratory  
California Institute of Technology

SD-75000-100-Revision A - Supplement A

JPL D-300-1-Revision B - Supplement A



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MISSION PLAN  
POST LAUNCH  
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## Change Log

Change Letter	Date	Affected Sections
-	04/13/99	Draft
-	12/08/99	Final, Release approved with MCR 579 rev a

## 1.0 Introduction

The purpose of this document is to provide a post launch update to information that is key to the successful implementation of the Stardust Mission Plan. The update is required as a result of having launched on the second of Stardust's 20 day launch period, February 7, 1999. Mission plans described in the parent document of this supplement are applicable to launching on the first day of the launch period, February 6, 1999. This supplement is consistent with the Stardust operations ephemeris designated:

SDU\_L\_991117\_990207\_060401.bsp

Most changes reflected in this document are fairly minor, consisting in updating mission plan schedules, typically listed in number of days from launch. However, the schedule for two events has changed sufficiently to warrant further note:

1. Location of Deep Space Maneuver #1: In the February 7 baseline mission, the location of this maneuver is shifted earlier by 52 days, from 3/10/2000 to 1/18/2000. This location minimizes mission delta-V costs, allows for an increase in the Interstellar Dust Collection duration, and retains the possibility of an asteroid flyby in late 2002.
2. Schedule for Interstellar Dust Collection Period #1: Earlier execution of Deep Space Maneuver #1 allows for an earlier start to the first Interstellar Dust Collection period. The start of collection moves 16-28 days earlier, from 3/15/2000 to 2/16-28/2000. Geometrical data is provided in the document illustrating that collection could start as much as 49 days earlier than 3/15/2000. This option is not selected, however, given that it would place SRC operations only a few days prior to solar conjunction, an undesirable situation given the first time nature of the SRC operations.

No detailed information regarding the asteroid flyby opportunity mentioned in item 1 is included in this document. Just briefly, it is worth mentioning that the asteroid is named Annefrank, and the flyby opportunity falls on November 2, 2002, about 13 months prior to the Wild-2 flyby. They flyby opportunity overlaps the second interstellar dust collection period, but has no impact on the remainder of the mission. An additional supplement to the mission plan will be issued if the Stardust Project decides to include Annefrank activities in the mission baseline.

This supplement, together with the Mission Plan document, describes the intended implementation of the Stardust Project Plans. No attempt has been made to reflect historical deviations from this plan. Future major deviations, if known far enough in advance, will be documented in similar supplements to the Mission Plan document. For historical deviations from the Mission Plan, please refer to operations status reports.

Section 4.0 Additional Mission Plan MCRs (Mission Change Request) includes additional major changes to the mission plan (known at the time of publication) for which formal documentation in the Mission Plan was not deemed of any benefit (i.e. implementation planning occurred prior to documentation in the Mission Plan).

Finally, this document assumes the reader is familiar with the Stardust Mission language and the latest version of the Stardust Mission plan (SD-75000-100-Rev. A, or JPL D-300-1-Rev. B, dated February 1, 1999).

## **2.0 Post Launch Figure Updates**

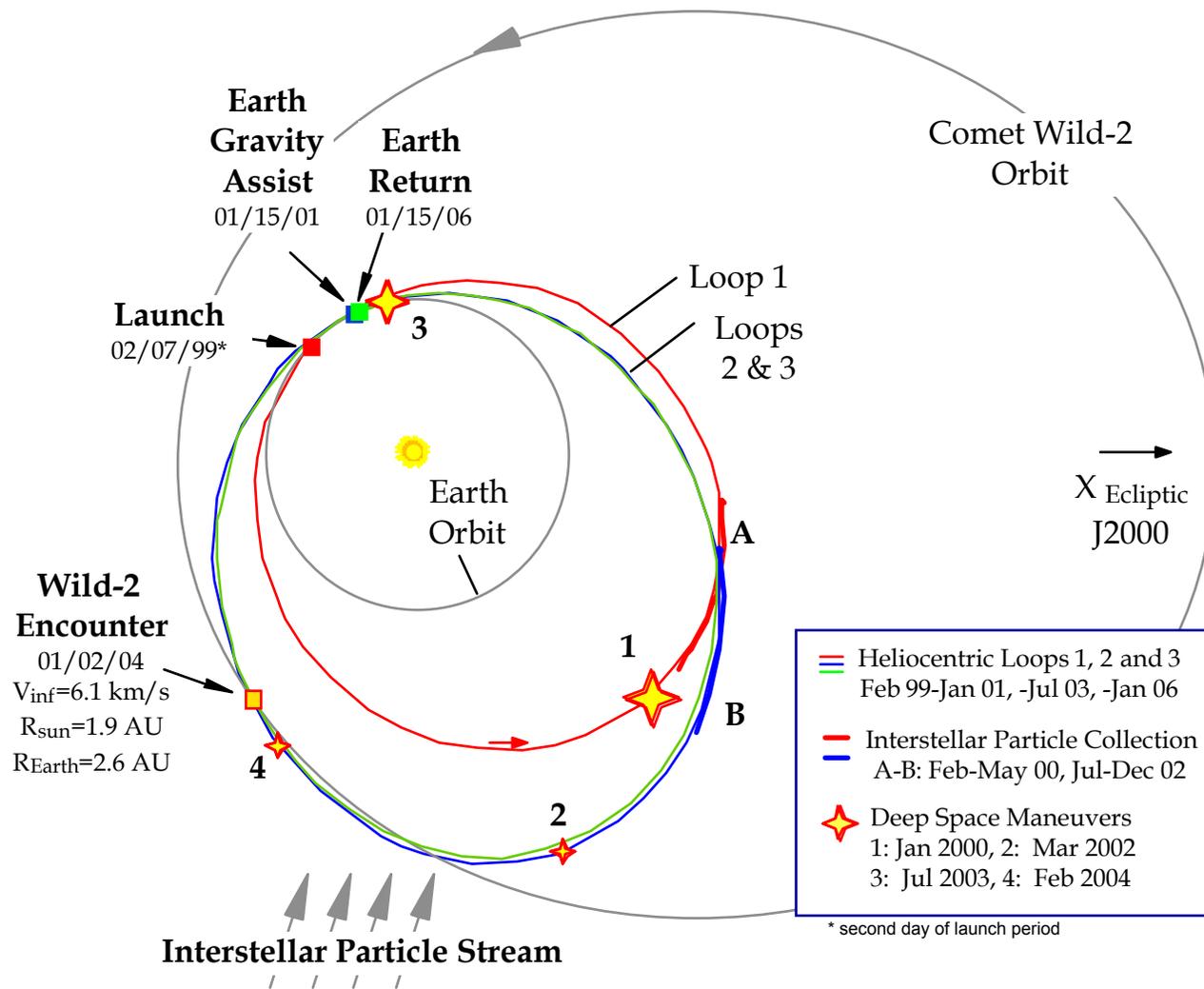


Figure 2.3-1 STARDUST (E-E-W2-E) Heliocentric Trajectory

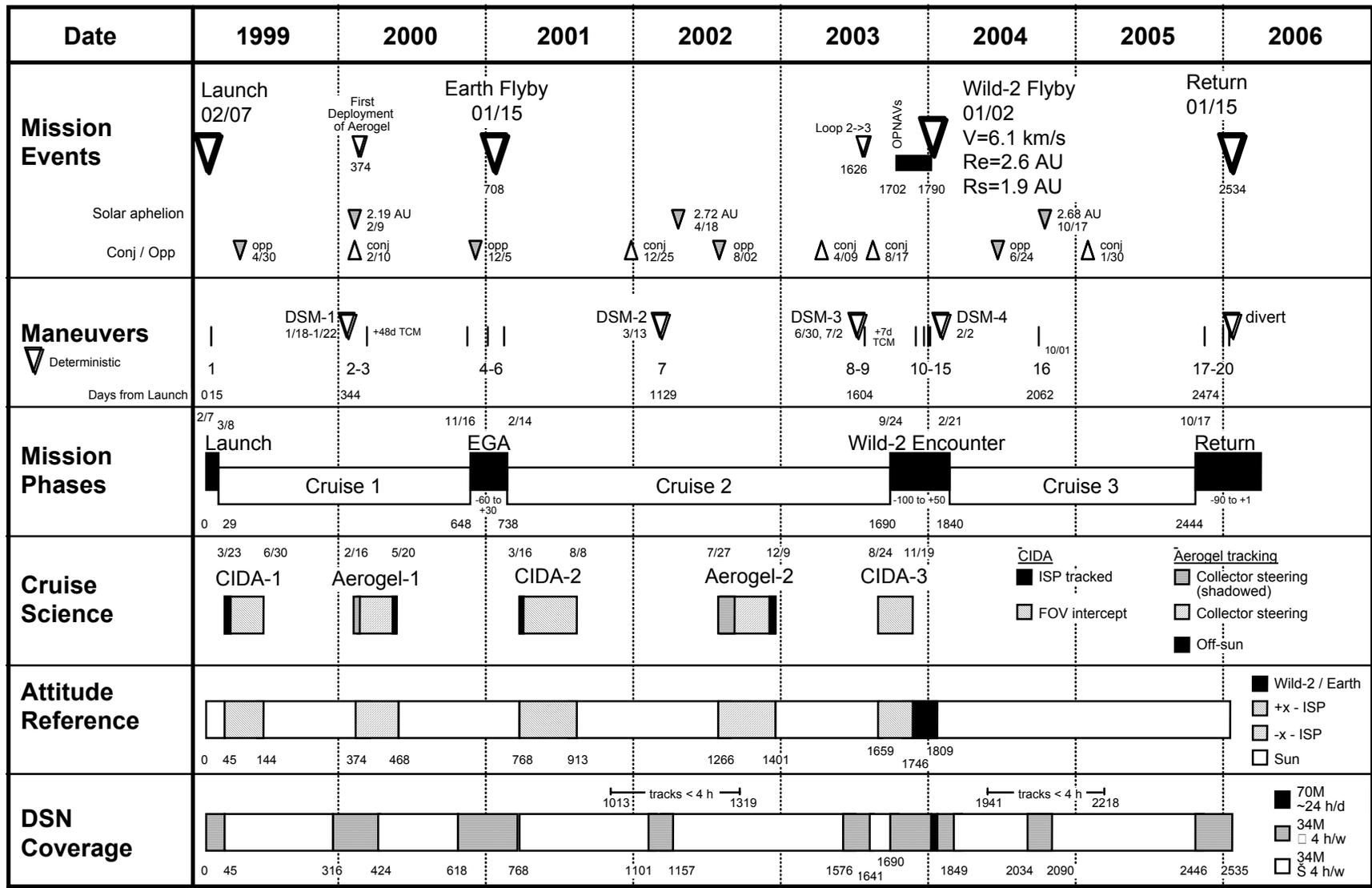


Figure 2.3-2 STARDUST Mission Overview (1999-2006)

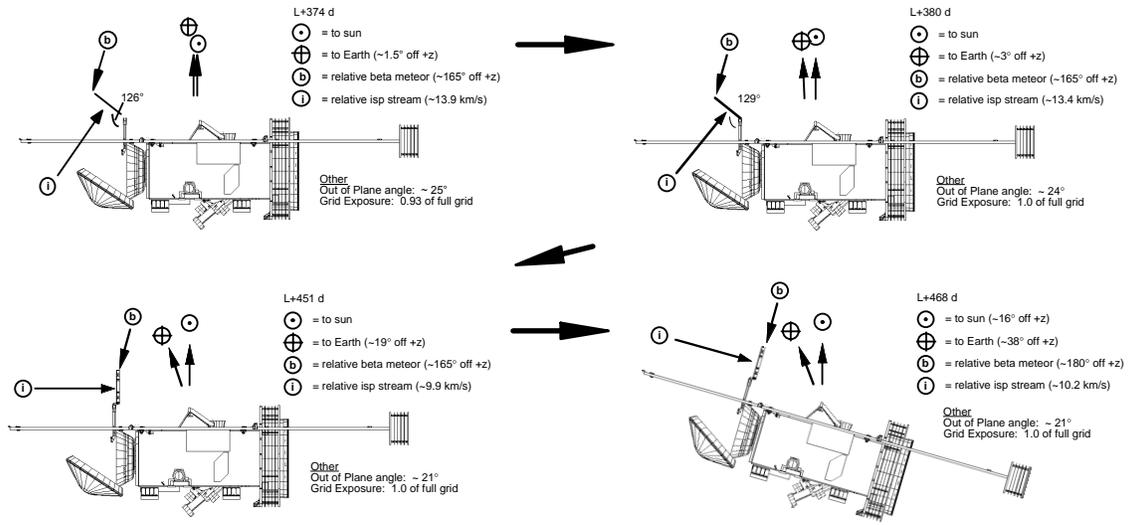


Figure 4.2-1 Profile of ISP Collection Experiment - Loop 1

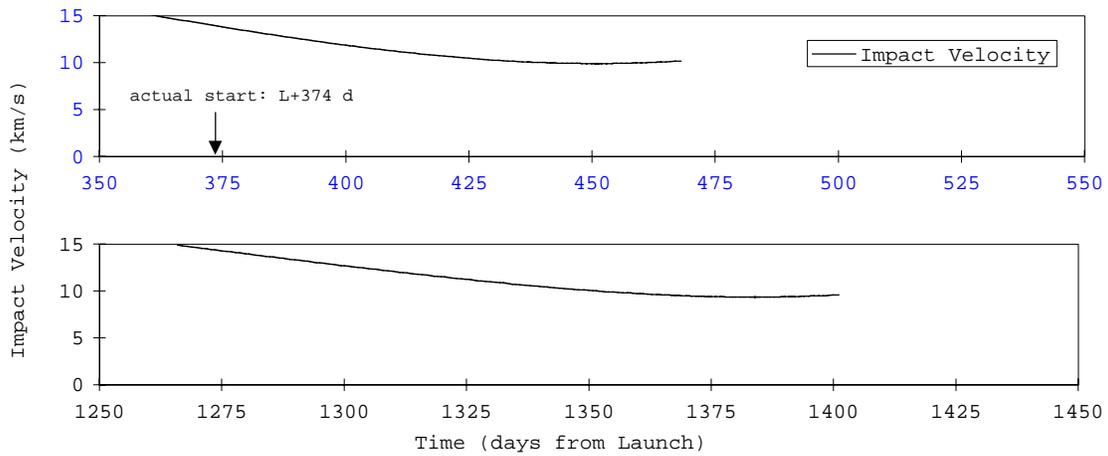


Figure 4.2-2 ISP Impact Velocity History ( $\beta=1$  particle)

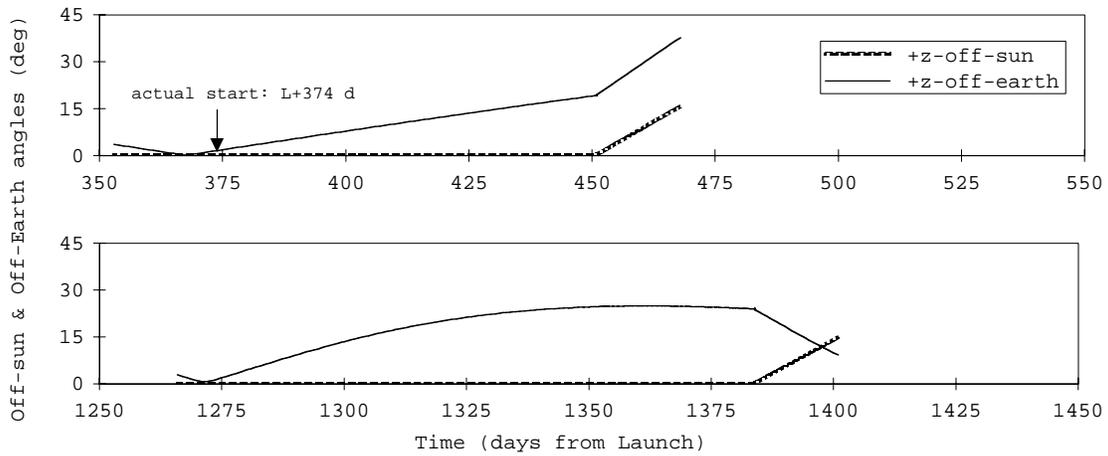


Figure 4.2-3.a. Spacecraft +z-axis Off-sun and Off-Earth Angle History

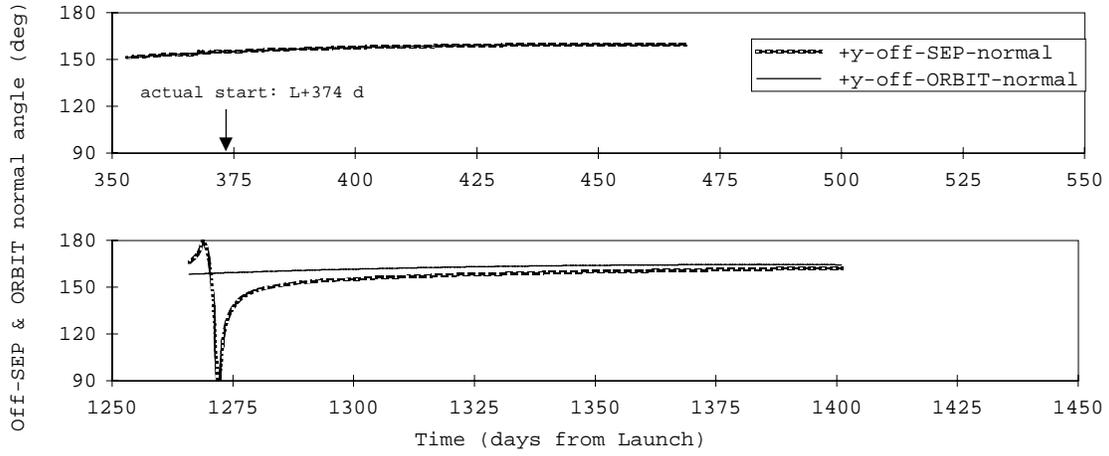


Figure 4.2-3.b. Spacecraft +y-axis Yaw Angle History

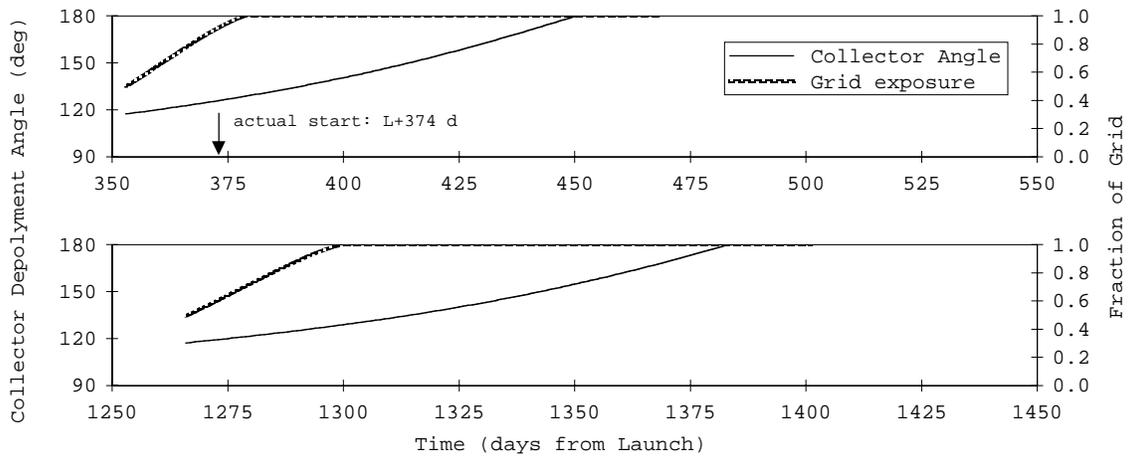


Figure 4.2-4.a. Collector Deployment Angle and Grid Exposure History

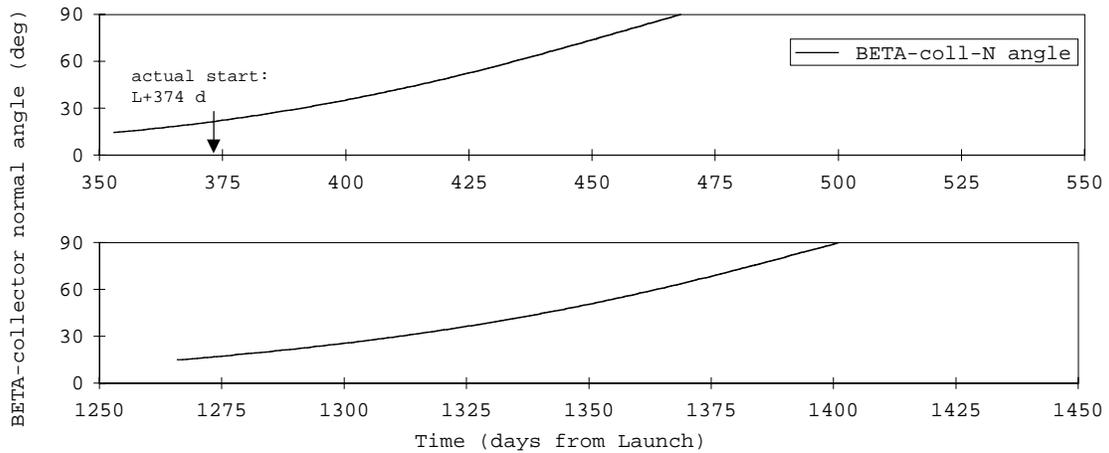


Figure 4.2-4.b. Beta Meteoroid Impact Angle

### **3.0 Post Launch Table Updates**

Table 2.3-1 STARDUST Mission Phases

Main Phase	Subphases	Time (L+days)	Duration (days)
Launch	Initial Acquisition, Activation and Checkout, TCM 1	0 - 29	29
Cruise 1 (Earth - Earth)	ISP Collection, DSM 1, TCM 3	29 - 648	619
Earth Gravity Assist (EGA-60d to +30d)	TCM 4-6	648 - 738	90
Cruise 2 (Earth-Wild-2)	ISP Collection, DSM 2, DSM 3, TCM 9	738 - 1690	952
Wild-2 Encounter (E-100d to E+50d)	Far, Near, Close, Closest, Post TCM 10-14, DSM 4	1690 - 1840	150
Cruise 3 (Wild-2 - Earth)	TCM 16	1840 - 2444	604
Earth Return (ER-90d to ER+1d)	Approach, Entry, Descent, Recovery, Post Recovery, TCM 17-19, Divert (TCM 20)	2444 - 2535	91

Table 2.3-2 Baseline Mission Parameters vs. Launch Date

Event	Quantity	Value
Launch	Date, Time (UTC)	02/07/99, 21:04:57
	Injection (ET)	21:32:10.7
	C3(km <sup>2</sup> /s <sup>2</sup> ), DLA (deg), RLA (deg)	26.0, -19.695, 235.173
	Mass (kg)	394.000
DSM11	Date, Time (ET)	01/18/99, 18:01:04
	DV (m/s), Prop (kg)	60.00, 11.57
	*Burn DEC (deg), RA (deg)	-7.98, 211.49
DSM12	Date, Time (ET)	01/20/99, 18:01:04
	DV (m/s), Prop (kg)	60.00, 11.22
	*Burn DEC (deg), RA (deg)	-8.09, 212.13
DSM13	Date, Time (ET)	01/22/99, 18:01:04
	DV (m/s), Prop (kg)	51.98, 9.44
	*Burn DEC (deg), RA (deg)	-8.21, 212.77
EGA	*Date, Time (ET)	01/15/01, 10:51:17
	*Altitude (km), *B-plane Angle (deg)	6049.6, 144.241
	*V infinity (km/s), *Mass (kg)	6.480, 361.587
DSM2	Date, Time (ET)	03/13/02, 18:01:04
	DV (m/s), Prop (kg)	0.00, 0.00
	*Burn DEC (deg), RA (deg)	n/a, n/a
DSM3 Note 3	Date, Time (ET)	07/01/03, 18:01:04
	DV (m/s), Prop (kg)	70.09, 12.30
	*Burn DEC (deg), RA (deg)	10.97, 3.21
Wild-2 Encounter Note 4	Date, Time (ET)	01/02/04, 19:20:00.0
	*V infinity (km/s), *Mass (kg)	6.120, 337.612
	z-Earth, z-Sun angles (deg)	0.125, 16.630
DSM4	Date, Time (ET)	02/02/04, 18:01:04
	DV (m/s), Prop (kg)	1.38, 0.24
	*Burn DEC (deg), RA (deg)	77.15, 159.50
Earth Return	Date, Time (ET)	01/15/06, 09:58:08
	*V infinity (km/s), *B plane angle (deg)	6.418, -41.069
	*DEC (deg), RA (deg)	10.984, 207.602
	*Mass (kg)	336.715
Total DV (m/s)		241.723

Notes:

- 5.0 ET-UTC = 64.185 sec at Launch
6. RA, DEC values provided in EME J2000
7. Reflects current modeling in Navigation trajectory development. This maneuver is likely to be implemented in two portions, on 6/30 and 7/2.
8.  $i = V_{rel}$ ,  $j = toEarth$  X  $i$ ,  $z = i$  X  $j$

Table 4.1-1 Cruise Phase Subphase Definition

Cruise Phase	Sub-Phases	Time (L+days)	Duration (days)
Cruise 1 (Earth-Earth)		29 - 648	619
	DSM-1 (TCM 2)	344 - 348	5
	ISP Collection	374 - 468	94
	TCM 3 (DSM-1 + 48 d)	396	-
Cruise 2 (Earth-Wild-2)		738 - 1690	952
	ISP Collection	1266 - 1401	135
	DSM-2 (TCM 7)	1129	1
	DSM-3 (TCM 8)	1604 - 1606	3
Cruise 3 (Wild-2-Earth)		1840 - 2444	604
	TCM 16 (3rd aphelion)	2062	-

Table 4.2-1.a Interstellar Particle Collection Subphases

Period	Start (L+days)	End (L+days)	Duration (days)	Equivalent Full Grid Duration (days)
1	374-386	468	82-94	82-94
2	1266	1401	135	127
Total	-	-	217-229	209-221

Table 4.2-2 Interstellar Particle Related CIDA Experiment Periods

Period	Start (L+days)	End (L+days)	Duration (days)	Equivalent Full Target Duration (days)
1	45	144	99	52
2	768	913	145	74
3	1702	1746	44	28
Total	-	-	288	154

Table 4.3-1.a Cruise Phase Mission Operations

Mission Operation	Description	
Communications	4 <sup>(1)</sup> hrs / week, antenna: MGA 4 <sup>(1)</sup> hrs / month, antenna: HGA, can replace navigation tracking TCM/DSMs (overlay changes for DSM 1,2 / TCM 3,16 below)- Two - 4 hr pass/week - MGA Comm, -14 to -28, +14 to +28d 4 hrs /day - MGA Comm, ± 14 d of first/last segments 1 hr / between seg. - HGA Comm, DSMs only - if possible DSM 1 / TCM 3 (overlap with ISP-1) - overlay changes: 4 hrs /day - HGA Comm, 0 to +7 d, DSM-1 Two - 4 hr pass/week - HGA Comm, +7 d DSM-1 to -7 d TCM 3 4 hrs /day - HGA Comm, -7 to 0 d, TCM 3 Two - 4 hr passes/week - MGA Comm, +7 to +28 d, TCM 3 DSM 2 / TCM 16 (aphelion maneuvers) - overlay changes: 4 <sup>(1)</sup> hrs / every other day - MGA Comm, ± 14 d	
Navigation	L+344-348 d: DSM-1 (TCM 2) L+396 d: TCM 3 L+1129 d: DSM-2 (TCM 7)	L+1604-1606 d: DSM-3 (TCM 8) L+1613 d: TCM 9 L+2062 d: TCM 16

1. Or maximum allowable at solar ranges greater than 2.5 AU Minimum of 2 hours for radiometric tracking.

Table 4.3-1.b Cruise Phase Mission Operations - DSN Profile

Antennas:	All 34-m <sup>(2)</sup>	
L+29 to +43d: 2*4 h/w <sup>(3)</sup>	L+752 to +766d: 2*4 h/w	L+1690 to +1840d: Encounter
L+43 to +316d: 4 h/w	L+766 to L+1013: 4 h/w	L+1840 to +1849d: 2*4h/w
L+316 to +337d: 2*4 h/w	L+1013 to +1101d: 4 <sup>(1)</sup> h/w	L+1849 to +1941d: 4 h/w
L+337 to +355d: 4 h/d	L+1101 to +1117d: 2*4 <sup>(1)</sup> h/w	L+1941 to +2034d: 4 <sup>(1)</sup> h/w
L+355 to +389d: 2*4 h/w	L+1115 to +1143d: 4 <sup>(1)</sup> h/ 2d	L+2034 to +2048d: 2*4 <sup>(1)</sup> h/w
L+389 to +403d: 4 h/d	L+1143 to +1157d: 2*4 <sup>(1)</sup> h/w	L+2048 to +2076d: 4 <sup>(1)</sup> h/ 2d
L+403 to +424d: 2*4 h/w	L+1157 to +1319d: 4 <sup>(1)</sup> h/w	L+2076 to +2090d: 2*4 <sup>(1)</sup> h/w
L+424 to +620d: 4 h/w	L+1319 to +1580d: 4 h/w	L+2090 to +2218d: 4 <sup>(1)</sup> h/w
L+620 to +634d: 2*4 h/w	L+1580 to +1594d: 2*4 h/w	L+2218 to +2444d: 4 h/w
L+634 to +648d: 4 h/d	L+1594 to +1631d: 4 h/d	L+2444 to +2535d: Return
L+648 to +738d: EGA	L+1631 to +1645d: 2*4 h/w	
L+738 to +752d: 4 h/d	L+1645 to +1690d: 4 h/w	

1. Or maximum allowable at solar ranges greater than 2.5 AU Minimum of 2 hours for radiometric tracking.

2. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.

3. A\*B = A number of tracks at B frequency

Table 4.3-1.c Cruise Phase Mission Operations - Spacecraft Attitude <sup>(1)</sup>

Time (days)	Description	angz (°)	angy (°)	db (°)
L+0 to 20	Launch Phase			
L+29 to 45	constant off-sun	22	180	15
L+45 to 54	CIDA tracking	-	-	15
L+54 to 144	CIDA constant off-sun	-20	-	15
L+144 to 374	constant off-sun	0	180	15
L+374 to 452	ISP collector steering	-	-	15
L+452 to 468	ISP tracking	-	-	15
L+468 to 648	constant off-sun	0	0	15
L+648 to 738	EGA Phase			
L+738 to 743	constant off-sun	20	0	15
L+743 to 768	constant off-sun	0	0	15
L+768 to 779	CIDA tracking	-	-	15
L+779 to 913	CIDA constant off-sun	-20	-	15
L+913 to 1052	constant off-sun	0	180	15
L+1052 to 1266	constant off-sun	0	0	15
L+1266 to 1384	ISP collector steering	-	-	15
L+1384 to 1401	ISP tracking	-	-	15
L+1401 to 1522	constant off-sun	0	180	15
L+1522 to 1657	constant off-sun	0	0	15
L+1657 to 1690	constant off-sun	0	180	15
L+1690 to 1840	Encounter Phase			
L+1840 to 1964	constant off-sun	0	0	15
L+1964 to 2184	constant off-sun	0	180	15
L+2184 to 2444	constant off-sun	0	0	15
L+2444 to 2535	Return Phase			
MGA communications: 7° off +z-axis to Earth				6
HGA communications: +z-axis to Earth				2

1. See section 10 for attitude mode definitions.

Table 5.1-1 Earth Gravity Assist Phase Subphase Definition

Mission Phase	Subphases	Time (L+days)	Duration (days)
Earth Gravity Assist (EGA-60d to +30d)		648 - 738	90
	TCM 4 (EGA-60 d)	648	-
	TCM 5 (EGA-10 d)	698	-
	TCM 6 (EGA+30 d)	738	-

Table 5.2-1 Earth Gravity Assist Phase Mission Operations

Mission Operation	Description				
Communications All MGA, except LGA: L+707-727	EGA - 8 hrs /day, within ±14 days TCMs - Two - 4 hr passes week, -14 to -28, +14 to +28d 4 hrs / day, within ± 14 days				
Navigation	L+648 (EGA-60 d): TCM 4 L+698 (EGA-10 d): TCM 5		L+738 (EGA+30 d): TCM 6		
Spacecraft Attitude (see section 10 for attitude mode definitions)	Time	Description	angz (°)	angy (°)	db (°)
	L+648 to 667 d	constant off-sun	0	0	15
	L+667 to 703 d	constant off-sun	0	180	15
	L+703 to 707 d	constant off-sun	-17	180	15
	L+707 to 708 d	constant off-sun	-45	0	15
	L+708 to 727 d	constant off-sun	-45	180	15
	L+727 to 738 d	constant off-sun	20	0	15
	MGA communications: 7° off +z-axis to Earth				6
DSN Profile All 34-m <sup>(1)</sup>	L+648 to +662d: 4 h/d L+662 to +684d: 2*4 h/w <sup>(2)</sup> L+684 to +694d: 4 h/d		L+694 to +722d: 8 h/d L+722 to +738d: 4 h/d		

1. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.
2. A\*B = A number of tracks at B frequency

Table 6.1-1 Wild-2 Encounter Phase Subphase Definition

Mission Phase	Sub-Phases	Time	Duration
Wild-2 Encounter (E-100d to +50d)		L+1690 - 1840d	150 d
	Far Encounter	E-100 to -1d	99 d
	Near Encounter	E-1d to -5h	19 h
	Close Encounter	E-5 to +5h	10 h
	Closest Encounter	E-5 to +5 m	10 min
	Post Encounter	E+5h to +50d	50 d
	TCM 10 (E-30 d)	L+1760 d	-
	TCM 11 (E-10 d)	L+1780 d	-
	TCM 12 (E-2 d)	L+1788 d	-
	TCM 13 (E-18 h)	L+1789 d	-
	TCM 14 (E-6 h)	L+1790 d	-
DSM 4 (TCM 15) (E+31 d)	L+1821 d	-	

Table 6.3-1 Wild-2 Encounter Phase Mission Operations

Mission Operation	Description				
Communications	8 hrs / wk - HGA Comm - E-100 to -7d, no s/c flip (small SEP) 8 hrs / day - HGA Comm - E-7 to E-1d 24 hrs / day - HGA Comm - E-2 to +3d, +5 to +8d, +10 to +13d 8 hrs / wk - HGA Comm - E+13 to E+50d TCMs - Two - 4 hr passes week - MGA Comm -14 to -28, +14 to +28d 4 hrs / day - MGA Comm within ± 14 days Encounter - 4 hrs / day - MGA Comm within ± 30 days				
Navigation	L+1760 d (E-30 d): TCM 10		L+1789 d (E-18 h): TCM 13		
	L+1780 d (E-10 d): TCM 11		L+1790 d (E-6 h): TCM 14		
	L+1788 d (E-2 d): TCM 12		L+1821 d (E+31 d): DSM 4 (# 15)		
Spacecraft Attitude (see section 10 for attitude mode definitions)	Time (days)	Description	angz (°)	angy (°)	db (°)
	L+1690 to 1702	constant off-sun	0	180	15
	L+1702 to 1746	CIDA cst. off-sun	-20	0	15
	L+1746 to 1779	MGA track Earth	-	-	15
	L+1779 to 1788	HGA track Earth	-	-	15
	L+1788 to 1791	Encounter	-	-	2
	L+1791 to 1804	HGA track Earth	-	-	2
	L+1804 to 1810	HGA track Earth	-	-	15
	L+1810 to 1840	constant off-sun	0	0	15
	MGA communications: 7° off +z-axis to Earth				6
	HGA communications: +z-axis to Earth				2
Encounter mode				0.3	
Imaging mode				0.5	
DSN Profile <sup>(1)</sup> All 34-m HEF except selective 70-m from L+1788 to +1803d	L+1690 to +1732d: 8 h/w L+1732 to +1740d: 2*4 h/w <sup>(2)</sup> L+1740 to +1746d: 2*8 h/w L+1746 to +1783d: 4 h/d L+1783 to +1788d: 8 h/d L+1788 to +1793d: 24 h/d		L+1793 to +1795d: 4 h/d L+1795 to +1798d: 24 h/d L+1798 to +1800d: 4 h/d L+1800 to +1803d: 24 h/d L+1803 to +1834d: 4 h/d L+1834 to +1840d: 2*4 h/w		

1. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.
2. A\*B = A number of tracks at B frequency

Table 7.1-1 Earth Return Phase Subphase Definition

Mission Phase	Sub-Phases	Time	Duration
Earth Return (ER-90 to ER+1d)	Approach TCM 17 (ER-60 d) TCM 18 (ER-13 d) TCM 19 (ER-1 d) SRC release S/C divert (TCM 20)	L+2444 - 2535d	91d
		L+2520 - 2534d	14d
		L+2474d	-
		L+2521d	-
		L+2533d	-
		ER-4h	-
		ER-3h	-
	SRC Entry / Descent Atmospheric Entry Parachute Descent SRC Recovery S/C Post Divert	ER+0 - +8m	~8 m
		ER+8 - +15m	~7 m
		ER+15 - +75m	~60 m
	ER-3h - +1d	~1 d	

Table 7.3-1 Earth Return Phase Mission Operations

Mission Operation	Description				
Communications All MGA, exc. LGA: > L+2507	Return - 16 hrs /day, within ER-14 days TCMs - Two - 4 hr passes week, -14 to -28, +14 to +28d 4 hrs / day, within ± 14 days				
Navigation	L+2474 (ER-60 d): TCM 17 L+2521 (ER-13 d): TCM 18		L+2532 (ER-1 d): TCM 19 L+2533 (divert): TCM 20		
Spacecraft Attitude (see section 10 for attitude mode definitions)	Time (days)	Description	angz (°)	angy (°)	db (°)
	L+2444 to 2458	constant off-sun	0	0	15
	L+2458 to 2488	constant off-sun	0	180	15
	L+2487 to 2508	constant off-sun	-21	180	15
	L+2508 to 2532	constant off-sun	45	0	15
	L+2532 to 2534	constant off-sun	26	0	15
	L+2534 to 2536	constant off-sun	45	0	15
	MGA communications: 7° off +z-axis to Earth				6
DSN Profile All 34M <sup>(1)</sup>	L+2444 to +2460 d: 2*4 h/w <sup>(2)</sup> L+2460 to +2488 d: 4 h/d L+2488 to +2507 d: 2*4 h/w		L+2507 to 2520 d: 2*4 h/w L+2520 to 2535 d: 2*8 h/d		

1. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.
2. A\*B = A number of tracks at B frequency

Table 10.1-3 Spacecraft Attitude Profile - Limit Cycle Model

Time From Launch	Attitude Option	Off-sun Angle (deg)	Deadband Option	Time From Launch	Attitude Option	Off-sun Angle (deg)	Deadband Option
0	21	45	1	1384	33	-	1
29	22	22	1	1401	11	-	1
45	41	-	1	1522	12	-	1
54	42	20	1	1657	11	-	1
144	11	-	1	1702	42	20	1
374	31	-	1	1746	22	3	1
451	33	-	1	1759	22	5	1
468	12	-	1	1769	22	7	1
667	11	-	1	1779	22	16	1
703	21	17	1	1789	22	18	2
707	22	45	1	1804	22	20	1
708	21	45	1	1810	12	-	1
727	22	20	1	1964	11	-	1
743	12	-	1	2184	12	-	1
768	41	-	1	2458	11	-	1
779	42	20	1	2488	21	21	1
913	11	-	1	2508	22	45	1
1052	12	-	1	2532	22	26	1
1266	31	-	1				

Table 10.2-5 Spacecraft Attitude Profile - Slew  $\Delta V$  Model

Start Time (dFL)	End Time (dFL)	Attitude index	Angz (deg)	Angy <sup>1</sup> (deg)	Flip-y? (opt)	Deadband	Slew Group
0	29	1	-45	180	(0)	1	0
29	45	1	22	0	(0)	1	3
45	54	2	(0)	(180)	(0)	1	3
54	144	3	-20	(180)	(0)	1	0
144	374	1	0	180	(0)	1	4
374	451	5	(0)	(180)	(0)	1	5
451	468	6	(0)	(180)	(0)	1	0
468	667	1	0	0	(0)	1	6
667	703	1	0	180	(0)	1	5
703	707	1	-17	180	(0)	1	2
707	708	1	-45	0	(0)	1	3
708	727	1	-45	180	(0)	1	3
727	743	1	20	0	(0)	1	3
743	768	1	0	0	(0)	1	2
768	779	2	(0)	(180)	(0)	1	7
779	913	3	-20	(180)	(0)	1	0
913	1052	1	0	180	(0)	1	4
1052	1066	1	0	0	(0)	1	5
1266	1384	5	(0)	(180)	(0)	1	5
1384	1401	6	(0)	(180)	(0)	1	0
1401	1522	1	0	180	(0)	1	4
1522	1657	1	0	0	(0)	1	5
1657	1702	1	0	180	(0)	1	5
1702	1746	3	-20	(180)	(0)	1	7
1746	1779	11	(0)	(0)	(0)	1	3
1779	1788	12	(0)	(0)	0	1	2
1788	1791	10	(0)	(0)	(0)	3	4
1791	1804	12	(0)	(0)	0	3	4
1804	1810	12	(0)	(0)	0	1	0
1810	1965	1	0	0	(0)	1	2
1964	2184	1	0	180	(0)	1	5
2184	2458	1	0	0	(0)	1	5
2458	2488	1	0	180	(0)	1	5
2488	2508	1	-21	180	(0)	1	2
2508	2532	1	45	0	(0)	1	3
2532	2534	1	26	0	(0)	1	2
2534	2536	1	45	0	(0)	1	2

1. Values in parentheses do not influence actual attitude

Table 10.2-6 Communications Schedule

Time (dFL)	Dur (hrs)	Antenna	Flip-y? (opt)	Slew option
31,34,37,40,43	4	MGA	0	2
50,4,57,64,71,78	4	MGA	0	3
85,4,92,99,106,113,120,127,134,141	4	MGA	0	4
148,155,162,169,173,183,190,197,204,211,218, 225,232,239,246,253	4	MGA	0	2
260	4	HGA	0	2
267,274,281	4	MGA	0	2
291	4	HGA	0	2
302,308,318,321,323,326,	4	MGA	0	2
330	4	HGA	0	2
331-350	4	MGA	0	2
351	4	HGA	0	2
352-356,359,361,363,365	4	MGA	0	2
370,373	4	HGA	1	2
375,379,382,386,390-404,408,411,414,416,418, 421,425	4	HGA	1	4
432,438,444,450	4	MGA	0	7
456	4	MGA	0	3
463	4	HGA	0	3
470,477,484,491	4	MGA	0	2
498	4	HGA	0	2
505,512,519,526,533,540,547,554,561,568,575, 582,589,596,603,610,617,622,625,628,631,634- 662,665,668,671,673,675,678,681,684-693	4	MGA	0	2
694-706	8	MGA	0	2
727-752,755,758,761,764	4	MGA	0	2
771,778,785,792,799	4	MGA	0	3
806,813,820,827,834,841,848,855,862,869,876, 883,890,897,904,911	4	MGA	0	4
918,925,932	4	MGA	0	2
939	4	HGA	0	2
946,953,960,967	4	MGA	0	2
974	4	HGA	0	2
981,988,995,1002	4	MGA	0	2
1009	4	HGA	0	2
1016,1023,1030	3	MGA	0	2
1037	3	HGA	0	2
1045,1047,1056,1065,1072	3	MGA	0	2
1079	3	HGA	0	2
1086,1093,1100,1103,1106,1109,1112,1115,1117,1 119	3	MGA	0	2
1121	3	HGA	0	2
1123,1125,1127,1129,1131,1133,1135,1137,1139,1 141,1143,1146	3	MGA	0	2
1149	3	HGA	0	2
1152,1156,1163,1170,1177	3	MGA	0	2
1184	3	HGA	0	2
1191,1198,1205,1212	3	MGA	0	2
1219	3	HGA	0	2

Table 10.2-6 Communications Schedule (cont)

Time (dFL)	Dur (hrs)	Antenna	Flip-y? (opt)	Slew option
1226,1233,1240,1247,1254,1261	3	MGA	0	2
1268,1275,1282	3	MGA	0	7
1289,1296,1303,1310,1317	3	MGA	0	4
1324,1331	4	MGA	0	4
1338	4	HGA	0	4
1345,1352,1359,1366	4	MGA	0	4
1373	4	HGA	0	4
1380,1387,1394	4	MGA	0	4
1401	4	MGA	0	2
1408	4	HGA	0	2
1415,1422,1429,1436	4	MGA	0	2
1443	4	HGA	0	2
1450,1457,1464,1471	4	MGA	0	2
1478	4	HGA	0	2
1485,1492,1499,1506	4	MGA	0	2
1513	4	HGA	0	2
1520,1527,1534,1541	4	MGA	0	2
1548	4	HGA	0	2
1555,1562,1569,1576,1578,1581	4	MGA	0	2
1584	4	HGA	0	2
1587,1590,1593-1614	4	MGA	0	2
1615	4	HGA	0	2
1616-1629,1632,1635,1638,1641,1644,1646,1653, 1660	4	MGA	0	2
1667	4	HGA	0	2
1674,1681	4	MGA	0	2
1690	6	HGA	0	2
1697	8	HGA	0	2
1704,1711	8	HGA	1	3
1718,1725,1732,1738,1741,1745	8	HGA	1	4
1746,1747	4	MGA	0	1
1748	8	HGA	0	2
1749-1751	4	MGA	0	1
1752	8	HGA	0	2
1753,1754	4	MGA	0	1
1755	8	HGA	0	2
1756-1758	4	MGA	0	1
1759	8	HGA	0	2
1760,1761	4	MGA	0	1
1762	8	HGA	0	2
1763-1765	4	MGA	0	1
1766	8	HGA	0	2
1767,1768	4	MGA	0	1
1769	8	HGA	0	2
1770-1772	4	MGA	0	1
1773	8	HGA	0	2
1774,1775	4	MGA	0	1
1776	8	HGA	0	2

Table 10.2-6 Communications Schedule (cont)

Time (dFL)	Dur (hrs)	Antenna	Flip-y? (opt)	Slew option
1777,1778	4	MGA	0	1
1779	8	HGA	0	1
1780	4	HGA	0	1
1781	8	HGA	0	1
1782	4	HGA	0	1
1783-1787	8	HGA	0	1
1804-1809	4	HGA	0	1
1810-1833,1836,1839	4	MGA	0	2
1842	4	HGA	0	2
1845,1849,1856,1863,1870	4	MGA	0	2
1877	4	HGA	0	2
1884,1891,1898,1905,1912,1919,1926,1933,1940	4	MGA	0	2
1947,1954,1961,1968,1975,1982,1989,1996,2003,2010,2017,2024,2031,2036,2039,2042,2045,2048,2050,2052,2054,2056,2058,2060,2062	3	MGA	0	2
2064	3	HGA	0	2
2066,2068,2070,2072,2074,2076,2079,2082	3	MGA	0	2
2094	3	HGA	0	2
2101,2108,2115,2122	3	MGA	0	2
2129	3	HGA	0	2
2136,2143,2150,2157	3	MGA	0	2
2164	3	HGA	0	2
2171,2178,2189,2192	3	MGA	0	2
2199	3	HGA	0	2
2206,2213	3	MGA	0	2
2220,2227	4	MGA	0	2
2234	4	HGA	0	2
2241,2248,2255,2262	4	MGA	0	2
2269	4	HGA	0	2
2276,2283,2290,2297	4	MGA	0	2
2304	4	HGA	0	2
2311,2318,2325,2332	4	MGA	0	2
2339	4	HGA	0	2
2346,2353,2360,2367,2374,2381,2388,2395,2402,2409,2416,2423,2430,2437,2444,2448,2451,2454,2457,2460-2488,2491,2494,2496,2499,2501,2504,2507	4	MGA	0	2

1. The communications schedule only shows those communication events that require a spacecraft turn to get to the communications attitude. This results in no slews scheduled just after launch (LGA comm: L+0-30 days), at and just after EGA (LGA comm: L+707-726 days) , at and just after encounter (encounter attitude is HGA to Earth: L+1788-1803 days), and just prior to Return (LGA comm: L+2508-2534 days).

Table 11-1 Event Listing

STARDUST EVENT LISTING OUTPUT  
 Generated on = 990330. 133135.

SCID = -29  
 SPK FILE = /usr/people/eah/opseph/SDU\_L\_990302\_990207\_060401\_prelim.bsp  
 LAU DATE = 2451217.39734610 990207. 213211.  
 RET DATE = 2453750.91536550 60115. 95808.

Planetary ephemeris = /usr/yyy/masl/ephem/de405s.bsp  
 Comet ephemeris = /usr/yyy/masl/ephem/wild2v4.bsp

FILE NOTES:

1. Trajectory events established from CATO summary.
2. Mission phases and TCMs established from pre-set schedule.
3. Geometry events identified from values calculated every 1.0 hours.
4. ISP and CIDA events determined by geometric constraints only. Conflicts with mission events are NOT reflected in listings. Geometric constraints examined in terms of I-ANG and BETA angles. I-ANG is the angle between the To Sun vector and the To ISP vector. BETA is the angle between the To ISP vector and the To BETA vector.
5. Time listed in ephemeris time (ET).

TRAJECTORY EVENTS

EVENT, JD, CALDATE(yymmdd hhmmss), TFL(day)				
LAUNCH	2451217.39734610	990207.	213211.	0.00
DSM 1-1	2451562.25074290	118.	180104.	344.85
DSM 1-2	2451564.25074290	120.	180104.	346.85
DSM 1-3	2451566.25074290	122.	180104.	348.85
EGA	2451924.95227940	10115.	105117.	707.55
DSM 2	2452347.25074280	20313.	180104.	1129.85
DSM 3-1	2452821.25074280	30630.	180104.	1603.85
DSM 3-2	2452823.25074280	30702.	180104.	1605.85
WILD-2	2453007.30555560	40102.	192000.	1789.91
DSM 4	2453038.25074280	40202.	180104.	1820.85
RETURN	2453750.91536550	60115.	95808.	2533.52

MISSION PHASES

EVENT, JD, CALDATE(yymmdd hhmmss), TFL(days)				
START LAUNCH	2451217.39734610	990207.	213211.	0.00
END LAUNCH	2451246.39734610	990308.	213211.	29.00
START EGA	2451864.95227940	1116.	105117.	647.55
END EGA	2451954.95227940	10214.	105117.	737.55
START ENCOUN	2452907.30555560	30924.	192000.	1689.91
END ENCOUN	2453057.30555560	40221.	192000.	1839.91
START RETURN	2453660.91536550	51017.	95808.	2443.52
END RETURN	2453751.91536550	60116.	95808.	2534.52

Table 11-1 Event Listing (cont)

TRAJECTORY CORRECTION MANEUVERS

EVENT, JD, CALDATE(yymmdd hhmmss), TFL(days)				
TCM 1	2451232.39734610	990222.	213211.	15.00
TCM 2a	2451562.25074290	118.	180104.	344.85
TCM 2b	2451564.25074290	120.	180104.	346.85
TCM 2c	2451566.25074290	122.	180104.	348.85

TCM 3	2451614.25074290	310.	180104.	396.85
TCM 4	2451864.95227940	1116.	105117.	647.55
TCM 5	2451914.95227940	10105.	105117.	697.55
TCM 6	2451954.95227940	10214.	105117.	737.55
TCM 7	2452347.25074280	20313.	180104.	1129.85
TCM 8a	2452821.25074280	30630.	180104.	1603.85
TCM 8b	2452823.25074280	30702.	180104.	1605.85
TCM 9	2452830.25074280	30709.	180104.	1612.85
TCM 10	2452977.30555560	31203.	192000.	1759.91
TCM 11	2452997.30555560	31223.	192000.	1779.91
TCM 12	2453005.30555560	31231.	192000.	1787.91
TCM 13	2453006.55555560	40102.	12000.	1789.16
TCM 14	2453007.05555560	40102.	132000.	1789.66
TCM 15	2453038.25074280	40202.	180104.	1820.85
TCM 16	2453279.50000004	41001.	0.	2062.10
TCM 17	2453690.91536550	51116.	95808.	2473.52
TCM 18	2453737.91536550	60102.	95808.	2520.52
TCM 19	2453749.91536550	60114.	95808.	2532.52
TCM 20	2453750.74869883	60115.	55808.	2533.35

#### SOLAR RANGE

JD, CALDATE, TFL, RANGE (AU), MIN/MAX					
2451219.73067943	990210.	53211.	2.33	0.99	MIN
2451584.56401277	210.	13211.	367.17	2.20	MAX
2451924.98067943	10115.	113211.	707.58	0.98	MIN
2452382.73067943	20418.	53211.	1165.33	2.72	MAX
2452843.06401277	30722.	133211.	1625.67	0.98	MIN
2453295.98067943	41017.	113211.	2078.58	2.68	MAX
2453748.98067943	60113.	113211.	2531.58	0.98	MIN
2453750.89734610	60115.	93211.	2533.50	0.98	MAX

#### EARTH RANGE

JD, CALDATE, TFL, RANGE (AU), MIN/MAX					
2451586.06401277	211.	133211.	368.67	3.18	MAX
2451924.93901277	10115.	103211.	707.54	0.00	MIN
2452281.48067943	20106.	233211.	1064.08	3.59	MAX
2452495.31401277	20808.	193211.	1277.92	1.59	MIN
2452669.85567943	30130.	83211.	1452.46	2.74	MAX
2452841.52234610	30721.	3211.	1624.12	2.00	MIN
2453001.06401277	31227.	133211.	1783.67	2.61	MAX
2453173.52234610	40617.	3211.	1956.12	1.53	MIN
2453389.48067943	50118.	233211.	2172.08	3.57	MAX
2453750.89734610	60115.	93211.	2533.50	0.00	MIN

Table 11-1 Event Listing (cont)

#### SEP ANGLE

JD, CALDATE, TFL, SEP (deg), MIN/MAX					
2451218.52234610	990209.	3211.	1.12	83.61	MIN
2451299.18901277	990430.	163211.	81.79	179.79	MAX
2451584.93901277	210.	103211.	367.54	0.01	MIN
2451883.81401277	1205.	73211.	666.42	179.98	MAX
2451924.98067943	10115.	113211.	707.58	53.07	MIN
2451997.56401277	10329.	13211.	780.17	164.97	MAX
2452269.02234610	11225.	123211.	1051.62	0.96	MIN
2452488.93901277	20802.	103211.	1271.54	178.51	MAX
2452739.10567943	30409.	143211.	1521.71	2.13	MIN
2452793.35567943	30602.	203211.	1575.96	7.63	MAX
2452868.77234610	30817.	63211.	1651.38	0.93	MIN
2453180.98067943	40624.	113211.	1963.58	177.76	MAX
2453400.73067943	50130.	53211.	2183.33	0.69	MIN

2453672.68901277	51029.	43211.	2455.29	164.95	MAX
2453749.81401277	60114.	73211.	2532.42	88.76	MIN
2453750.89734610	60115.	93211.	2533.50	121.52	MAX

SPE ANGLE

JD, CALDATE, TFL, SPE (deg), MIN/MAX

2451218.43901277	990208.	223211.	1.04	96.19	MAX
2451299.18901277	990430.	163211.	81.79	0.17	MIN
2451391.39734610	990731.	213211.	174.00	34.05	MAX
2451584.93901277	210.	103211.	367.54	0.01	MIN
2451788.10567943	831.	143211.	570.71	35.18	MAX
2451883.81401277	1205.	73211.	666.42	0.02	MIN
2451924.98067943	10115.	113211.	707.58	126.92	MAX
2451998.35567943	10329.	203211.	780.96	11.54	MIN
2452083.98067943	10623.	113211.	866.58	31.74	MAX
2452269.02234610	11225.	123211.	1051.62	0.36	MIN
2452404.77234610	20510.	63211.	1187.38	21.83	MAX
2452488.93901277	20802.	103211.	1271.54	0.58	MIN
2452579.06401277	21031.	133211.	1361.67	24.84	MAX
2452738.81401277	30409.	73211.	1521.42	1.44	MIN
2452800.93901277	30610.	103211.	1583.54	6.93	MAX
2452869.14734610	30817.	153211.	1651.75	0.92	MIN
2453088.85567943	40324.	83211.	1871.46	25.94	MAX
2453180.98067943	40624.	113211.	1963.58	0.89	MIN
2453264.52234610	40916.	3211.	2047.12	22.08	MAX
2453400.68901277	50130.	43211.	2183.29	0.26	MIN
2453587.06401277	50804.	133211.	2369.67	31.91	MAX
2453671.93901277	51028.	103211.	2454.54	11.44	MIN
2453749.93901277	60114.	103211.	2532.54	91.00	MAX
2453750.89734610	60115.	93211.	2533.50	58.48	MIN

Table 11-1 Event Listing (cont)

SEP ANGLE = 3

JD, CALDATE, TFL, SEP (deg), INB/OUTB

2451579.35567943	204.	203211.	361.96	3.01	INB
2451590.56401277	216.	13211.	373.17	3.00	OUTB
2452264.35567943	11220.	203211.	1046.96	3.01	INB
2452273.68901277	11230.	43211.	1056.29	3.01	OUTB
2452731.56401277	30402.	13211.	1514.17	3.00	INB
2452747.73067943	30418.	53211.	1530.33	3.00	OUTB
2452844.81401277	30724.	73211.	1627.42	3.00	INB
2452919.27234610	31006.	183211.	1701.88	3.00	OUTB
2453395.89734610	50125.	93211.	2178.50	3.00	INB
2453405.56401277	50204.	13211.	2188.17	3.01	OUTB

ISP COLLECTION

JD, CALDATE, TFL, I-ANG/BETA (deg), COMMENT

2451569.85567943	126.	83211.	352.46	152.99	START shadowed
2451597.23067943	222.	173211.	379.83	140.99	CONT end shadow
2451668.14734610	503.	153211.	450.75	89.99	CONT end steer
2451685.73067943	521.	53211.	468.33	89.98	END beta meteor
2452482.98067943	20727.	113211.	1265.58	152.99	START shadowed
2452518.27234610	20831.	183211.	1300.88	140.99	CONT end shadow
2452601.10567943	21122.	143211.	1383.71	89.98	CONT end steer
2452618.89734610	21210.	93211.	1401.50	89.97	END beta meteor
2453394.52234610	50124.	3211.	2177.12	152.99	START shadowed
2453428.73067943	50227.	53211.	2211.33	141.00	CONT end shadow

2453509.10567943	50518.	143211.	2291.71	89.98	CONT end steer
2453526.52234610	50605.	3211.	2309.12	90.00	END beta meteor

CIDA EXPERIMENT

JD, CALDATE, TFL,	I-ANG (deg),	COMMENT
2451236.89734610	990227. 93211.	19.50 90.00 START tracking
2451270.18901277	990401. 163211.	52.79 110.01 CONT FOV
2451361.02234610	990701. 123211.	143.62 145.50 END 1/4 FOV
2451417.68901277	990827. 43211.	200.29 160.01 MAX 0 FOV
2451956.60567943	10216. 23211.	739.21 90.01 START tracking
2451995.77234610	10327. 63211.	778.38 110.01 CONT FOV
2452132.35567943	10810. 203211.	914.96 145.51 END 1/4 FOV
2452228.39734610	11114. 213211.	1011.00 160.00 MAX 0 FOV
2452877.06401277	30825. 133211.	1659.67 90.02 START tracking
2452916.18901277	31003. 163211.	1698.79 110.00 CONT FOV
2453051.77234610	40216. 63211.	1834.38 145.50 END 1/4 FOV
2453146.35567943	40520. 203211.	1928.96 160.00 MAX 0 FOV

Table 11-2 Time Ordered Event Listing

CALDATE	TFL	DESCRIPTION	VALUE	JD
990207. 213211.	0.00	START LAUNCH		2451217.39734610
990207. 213211.	0.00	LAUNCH		2451217.39734610
990208. 223211.	1.04	max SPE angle (deg)	96.19	2451218.43901277
990209. 3211.	1.12	min SEP angle (deg)	83.61	2451218.52234610
990210. 53211.	2.33	min Solar range (AU)	0.99	2451219.73067943
990222. 213211.	15.00	tcm 1		2451232.39734610
990227. 93211.	19.50	START CIDA: TRACKIN		2451236.89734610
990308. 213211.	29.00	END LAUNCH		2451246.39734610
990401. 163211.	52.79	cont CIDA: FOV		2451270.18901277
990430. 163211.	81.79	max SEP angle (deg)	179.79	2451299.18901277
990430. 163211.	81.79	min SPE angle (deg)	0.17	2451299.18901277
990701. 123211.	143.62	END CIDA: 1/4 FOV		2451361.02234610
990731. 213211.	174.00	max SPE angle (deg)	34.05	2451391.39734610
990827. 43211.	200.29	MAX CIDA: 0 FOV		2451417.68901277
118. 180104.	344.85	tcm 2a		2451562.25074290
118. 180104.	344.85	DSM 1-1		2451562.25074290
120. 180104.	346.85	tcm 2b		2451564.25074290
120. 180104.	346.85	DSM 1-2		2451564.25074290
122. 180104.	348.85	tcm 2c		2451566.25074290
122. 180104.	348.85	DSM 1-3		2451566.25074290
126. 83211.	352.46	START ISP: SHADOWED		2451569.85567943
204. 203211.	361.96	inb SEP = 3 deg	3.01	2451579.35567943
210. 13211.	367.17	max Solar range (AU)	2.20	2451584.56401277
210. 103211.	367.54	min SEP angle (deg)	0.01	2451584.93901277
210. 103211.	367.54	min SPE angle (deg)	0.01	2451584.93901277
211. 133211.	368.67	max Earth range (AU)	3.18	2451586.06401277
216. 13211.	373.17	outb SEP = 3 deg	3.00	2451590.56401277
222. 173211.	379.83	cont ISP: end shadow		2451597.23067943
310. 180104.	396.85	tcm 3		2451614.25074290
503. 153211.	450.75	cont ISP: end steer		2451668.14734610
521. 53211.	468.33	END ISP: BETA METEOR		2451685.73067943
831. 143211.	570.71	max SPE angle (deg)	35.18	2451788.10567943
1116. 105117.	647.55	START EGA		2451864.95227940
1116. 105117.	647.55	tcm 4		2451864.95227940
1205. 73211.	666.42	max SEP angle (deg)	179.98	2451883.81401277
1205. 73211.	666.42	min SPE angle (deg)	0.02	2451883.81401277
10105. 105117.	697.55	tcm 5		2451914.95227940
10115. 103211.	707.54	min Earth range (AU)	0.00	2451924.93901277

10115.	105117.	707.55	EGA		2451924.95227940
10115.	113211.	707.58	min SEP angle (deg)	53.07	2451924.98067943
10115.	113211.	707.58	max SPE angle (deg)	126.92	2451924.98067943
10115.	113211.	707.58	min Solar range (AU)	0.98	2451924.98067943
10214.	105117.	737.55	END EGA		2451954.95227940
10214.	105117.	737.55	tcm 6		2451954.95227940
10216.	23211.	739.21	START CIDA: TRACKIN		2451956.60567943
10327.	63211.	778.38	cont CIDA: FOV		2451995.77234610
10329.	13211.	780.17	max SEP angle (deg)	164.97	2451997.56401277
10329.	203211.	780.96	min SPE angle (deg)	11.54	2451998.35567943
10623.	113211.	866.58	max SPE angle (deg)	31.74	2452083.98067943
10810.	203211.	914.96	END CIDA: 1/4 FOV		2452132.35567943
11114.	213211.	1011.00	MAX CIDA: 0 FOV		2452228.39734610
11220.	203211.	1046.96	inb SEP = 3 deg	3.01	2452264.35567943
11225.	123211.	1051.62	min SPE angle (deg)	0.36	2452269.02234610
11225.	123211.	1051.62	min SEP angle (deg)	0.96	2452269.02234610
11230.	43211.	1056.29	outb SEP = 3 deg	3.01	2452273.68901277
20106.	233211.	1064.08	max Earth range (AU)	3.59	2452281.48067943
20313.	180104.	1129.85	DSM 2		2452347.25074280
20313.	180104.	1129.85	tcm 7		2452347.25074280
20418.	53211.	1165.33	max Solar range (AU)	2.72	2452382.73067943
20510.	63211.	1187.38	max SPE angle (deg)	21.83	2452404.77234610
20727.	113211.	1265.58	START ISP: SHADOWED		2452482.98067943
20802.	103211.	1271.54	min SPE angle (deg)	0.58	2452488.93901277
20802.	103211.	1271.54	max SEP angle (deg)	178.51	2452488.93901277
20808.	193211.	1277.92	min Earth range (AU)	1.59	2452495.31401277
20831.	183211.	1300.88	cont ISP: end shadow		2452518.27234610
21031.	133211.	1361.67	max SPE angle (deg)	24.84	2452579.06401277
21122.	143211.	1383.71	cont ISP: end steer		2452601.10567943
21210.	93211.	1401.50	END ISP: BETA METEOR		2452618.89734610
30130.	83211.	1452.46	max Earth range (AU)	2.74	2452669.85567943
30402.	13211.	1514.17	inb SEP = 3 deg	3.00	2452731.56401277
30409.	73211.	1521.42	min SPE angle (deg)	1.44	2452738.81401277
30409.	143211.	1521.71	min SEP angle (deg)	2.13	2452739.10567943
30418.	53211.	1530.33	outb SEP = 3 deg	3.00	2452747.73067943
30602.	203211.	1575.96	max SEP angle (deg)	7.63	2452793.35567943
30610.	103211.	1583.54	max SPE angle (deg)	6.93	2452800.93901277
30630.	180104.	1603.85	tcm 8a		2452821.25074280
30630.	180104.	1603.85	DSM 3-1		2452821.25074280

Table 11-2 Time Ordered Event Listing (cont)

CALDATE	TFL	DESCRIPTION	VALUE	JD	
30702.	180104.	1605.85	tcm 8b	2452823.25074280	
30702.	180104.	1605.85	DSM 3-2	2452823.25074280	
30709.	180104.	1612.85	tcm 9	2452830.25074280	
30721.	3211.	1624.12	min Earth range (AU)	2.00	2452841.52234610
30722.	133211.	1625.67	min Solar range (AU)	0.98	2452843.06401277
30724.	73211.	1627.42	inb SEP = 3 deg	3.00	2452844.81401277
30817.	63211.	1651.38	min SEP angle (deg)	0.93	2452868.77234610
30817.	153211.	1651.75	min SPE angle (deg)	0.92	2452869.14734610
30825.	133211.	1659.67	START CIDA: TRACKIN		2452877.06401277
30924.	192000.	1689.91	START ENCOUN		2452907.30555560
31003.	163211.	1698.79	cont CIDA: FOV		2452916.18901277
31006.	183211.	1701.88	outb SEP = 3 deg	3.00	2452919.27234610
31203.	192000.	1759.91	tcm 10		2452977.30555560
31223.	192000.	1779.91	tcm 11		2452997.30555560
31227.	133211.	1783.67	max Earth range (AU)	2.61	2453001.06401277
31231.	192000.	1787.91	tcm 12		2453005.30555560
40102.	12000.	1789.16	tcm 13		2453006.55555560
40102.	132000.	1789.66	tcm 14		2453007.05555560
40102.	192000.	1789.91	WILD-2		2453007.30555560
40202.	180104.	1820.85	DSM 4		2453038.25074280
40202.	180104.	1820.85	tcm 15		2453038.25074280
40216.	63211.	1834.38	END CIDA: 1/4 FOV		2453051.77234610
40221.	192000.	1839.91	END ENCOUN		2453057.30555560
40324.	83211.	1871.46	max SPE angle (deg)	25.94	2453088.85567943
40520.	203211.	1928.96	MAX CIDA: 0 FOV		2453146.35567943
40617.	3211.	1956.12	min Earth range (AU)	1.53	2453173.52234610
40624.	113211.	1963.58	max SEP angle (deg)	177.76	2453180.98067943
40624.	113211.	1963.58	min SPE angle (deg)	0.89	2453180.98067943
40916.	3211.	2047.12	max SPE angle (deg)	22.08	2453264.52234610
41001.	0.	2062.10	tcm 16		2453279.50000004
41017.	113211.	2078.58	max Solar range (AU)	2.68	2453295.98067943
50118.	233211.	2172.08	max Earth range (AU)	3.57	2453389.48067943
50124.	3211.	2177.12	START ISP: SHADOWED		2453394.52234610
50125.	93211.	2178.50	inb SEP = 3 deg	3.00	2453395.89734610
50130.	43211.	2183.29	min SPE angle (deg)	0.26	2453400.68901277
50130.	53211.	2183.33	min SEP angle (deg)	0.69	2453400.73067943
50204.	13211.	2188.17	outb SEP = 3 deg	3.01	2453405.56401277
50227.	53211.	2211.33	cont ISP: end shadow		2453428.73067943

50518.	143211.	2291.71	cont ISP: end steer		2453509.10567943
50605.	3211.	2309.12	END ISP: BETA METEOR		2453526.52234610
50804.	133211.	2369.67	max SPE angle (deg)	31.91	2453587.06401277
51017.	95808.	2443.52	START RETURN		2453660.91536550
51028.	103211.	2454.54	min SPE angle (deg)	11.44	2453671.93901277
51029.	43211.	2455.29	max SEP angle (deg)	164.95	2453672.68901277
51116.	95808.	2473.52	tcm 17		2453690.91536550
60102.	95808.	2520.52	tcm 18		2453737.91536550
60113.	113211.	2531.58	min Solar range (AU)	0.98	2453748.98067943
60114.	73211.	2532.42	min SEP angle (deg)	88.76	2453749.81401277
60114.	95808.	2532.52	tcm 19		2453749.91536550
60114.	103211.	2532.54	max SPE angle (deg)	91.00	2453749.93901277
60115.	55808.	2533.35	tcm 20		2453750.74869883
60115.	93211.	2533.50	max Solar range (AU)	0.98	2453750.89734610
60115.	93211.	2533.50	min SPE angle (deg)	58.48	2453750.89734610
60115.	93211.	2533.50	max SEP angle (deg)	121.52	2453750.89734610
60115.	93211.	2533.50	min Earth range (AU)	0.00	2453750.89734610
60115.	95808.	2533.52	RETURN		2453750.91536550
60116.	95808.	2534.52	END RETURN		2453751.91536550

Table 12-1 ISP #1 Collection Period Characteristics

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	collector angle (deg) (2)	grid exposure	beta angle (deg)
353.	15.769	0.000	3.507	151.078	151.102	117.213	0.497	14.364
354.	15.674	0.000	3.266	151.295	151.322	117.599	0.518	14.626
355.	15.580	0.000	3.025	151.506	151.536	117.989	0.539	14.898
356.	15.486	0.000	2.785	151.712	151.746	118.382	0.560	15.180
357.	15.393	0.000	2.544	151.912	151.950	118.779	0.581	15.470
358.	15.300	0.000	2.303	152.107	152.150	119.180	0.602	15.769
359.	15.207	0.000	2.062	152.296	152.346	119.585	0.624	16.077
360.	15.115	0.000	1.821	152.479	152.536	119.994	0.645	16.393
361.	15.023	0.000	1.581	152.654	152.723	120.407	0.667	16.718
362.	14.931	0.000	1.340	152.822	152.905	120.824	0.689	17.050
363.	14.840	0.000	1.099	152.979	153.083	121.245	0.710	17.391
364.	14.750	0.000	0.858	153.121	153.257	121.671	0.732	17.740
365.	14.659	0.000	0.617	153.233	153.427	122.100	0.753	18.096
366.	14.570	0.000	0.376	153.269	153.594	122.534	0.774	18.460
367.	14.480	0.000	0.135	152.835	153.756	122.973	0.795	18.831
368.	14.391	0.000	0.105	155.120	153.915	123.415	0.816	19.210
369.	14.303	0.000	0.346	154.444	154.071	123.862	0.837	19.596
370.	14.215	0.000	0.587	154.446	154.223	124.314	0.857	19.989
371.	14.127	0.000	0.827	154.532	154.372	124.770	0.876	20.390
372.	14.040	0.000	1.067	154.643	154.517	125.231	0.895	20.798
373.	13.954	0.000	1.308	154.763	154.659	125.697	0.913	21.212
374.	(3) 13.868	0.000	1.548	154.887	154.798	126.167	0.931	21.634
375.	13.782	0.000	1.788	155.011	154.934	126.643	0.947	22.063
376.	13.697	0.000	2.027	155.136	155.067	127.123	0.962	22.498
377.	13.612	0.000	2.267	155.259	155.197	127.608	0.976	22.941
378.	13.528	0.000	2.507	155.381	155.324	128.098	0.987	23.390
379.	13.445	0.000	2.746	155.501	155.449	128.593	0.996	23.846
380.	13.362	0.000	2.986	155.619	155.571	129.094	1.000	24.309
381.	13.280	0.000	3.225	155.735	155.690	129.600	1.000	24.779
382.	13.198	0.000	3.464	155.848	155.806	130.110	1.000	25.255
383.	13.117	0.000	3.703	155.960	155.920	130.627	1.000	25.739
384.	13.036	0.000	3.942	156.069	156.031	131.149	1.000	26.229
385.	12.956	0.000	4.180	156.176	156.140	131.676	1.000	26.725
386.	12.877	0.000	4.419	156.281	156.246	132.209	1.000	27.229
387.	12.798	0.000	4.657	156.384	156.350	132.747	1.000	27.739
388.	12.720	0.000	4.895	156.484	156.452	133.292	1.000	28.256
389.	12.643	0.000	5.133	156.582	156.551	133.842	1.000	28.780
390.	12.566	0.000	5.371	156.679	156.648	134.397	1.000	29.311
391.	12.490	0.000	5.608	156.773	156.743	134.959	1.000	29.849
392.	12.415	0.000	5.845	156.865	156.836	135.527	1.000	30.393
393.	12.340	0.000	6.082	156.954	156.927	136.101	1.000	30.945
394.	12.266	0.000	6.319	157.042	157.015	136.681	1.000	31.503
395.	12.193	0.000	6.556	157.128	157.102	137.267	1.000	32.068
396.	12.121	0.000	6.792	157.212	157.187	137.859	1.000	32.641
397.	12.049	0.000	7.028	157.294	157.269	138.458	1.000	33.220
398.	11.978	0.000	7.263	157.374	157.350	139.063	1.000	33.806
399.	11.908	0.000	7.498	157.452	157.428	139.674	1.000	34.399
400.	11.839	0.000	7.733	157.528	157.505	140.292	1.000	35.000
401.	11.771	0.000	7.968	157.602	157.580	140.916	1.000	35.607
402.	11.704	0.000	8.202	157.674	157.653	141.547	1.000	36.222
403.	11.637	0.000	8.436	157.745	157.725	142.184	1.000	36.843
404.	11.571	0.000	8.669	157.814	157.794	142.828	1.000	37.472
405.	11.507	0.000	8.903	157.881	157.862	143.479	1.000	38.108
406.	11.443	0.000	9.136	157.947	157.928	144.136	1.000	38.751
407.	11.380	0.000	9.368	158.011	157.992	144.801	1.000	39.401
408.	11.318	0.000	9.600	158.073	158.055	145.471	1.000	40.058
409.	11.257	0.000	9.832	158.134	158.116	146.149	1.000	40.723
410.	11.198	0.000	10.064	158.192	158.175	146.834	1.000	41.395
411.	11.139	0.000	10.295	158.250	158.233	147.525	1.000	42.073
412.	11.081	0.000	10.526	158.306	158.289	148.224	1.000	42.760
413.	11.024	0.000	10.756	158.360	158.343	148.929	1.000	43.453
414.	10.969	0.000	10.986	158.412	158.396	149.641	1.000	44.153
415.	10.914	0.000	11.216	158.464	158.447	150.360	1.000	44.861
416.	10.861	0.000	11.445	158.513	158.497	151.086	1.000	45.576
417.	10.809	0.000	11.674	158.561	158.546	151.818	1.000	46.298
418.	10.758	0.000	11.902	158.608	158.592	152.558	1.000	47.027
419.	10.708	0.000	12.130	158.653	158.638	153.304	1.000	47.763
420.	10.659	0.000	12.358	158.696	158.681	154.057	1.000	48.506
421.	10.612	0.000	12.585	158.738	158.724	154.817	1.000	49.256
422.	10.566	0.000	12.812	158.779	158.764	155.584	1.000	50.013
423.	10.521	0.000	13.038	158.818	158.804	156.357	1.000	50.776

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Collector fully stowed at 0 deg, fully deployed at 180 deg.

3. Actual start at L+374 days

Table 12-1 ISP #1 Collection Period Characteristics (cont)

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	collector angle (deg) (2)	grid exposure	beta angle (deg)
424.	10.478	0.000	13.263	158.856	158.842	157.137	1.000	51.547
425.	10.436	0.000	13.489	158.892	158.878	157.923	1.000	52.324
426.	10.395	0.000	13.713	158.927	158.913	158.716	1.000	53.108
427.	10.355	0.000	13.937	158.960	158.947	159.515	1.000	53.898
428.	10.317	0.000	14.161	158.992	158.979	160.320	1.000	54.695
429.	10.281	0.000	14.384	159.023	159.010	161.132	1.000	55.497
430.	10.246	0.000	14.607	159.052	159.040	161.950	1.000	56.306
431.	10.212	0.000	14.828	159.080	159.068	162.773	1.000	57.122
432.	10.180	0.000	15.050	159.106	159.094	163.603	1.000	57.943
433.	10.149	0.000	15.271	159.131	159.119	164.438	1.000	58.769
434.	10.120	0.000	15.491	159.155	159.143	165.278	1.000	59.602
435.	10.092	0.000	15.711	159.177	159.166	166.124	1.000	60.440
436.	10.066	0.000	15.930	159.198	159.187	166.976	1.000	61.283
437.	10.042	0.000	16.149	159.217	159.207	167.832	1.000	62.131
438.	10.019	0.000	16.367	159.236	159.225	168.693	1.000	62.984
439.	9.998	0.000	16.584	159.252	159.242	169.559	1.000	63.843
440.	9.978	0.000	16.801	159.268	159.258	170.430	1.000	64.705
441.	9.960	0.000	17.017	159.282	159.272	171.304	1.000	65.572
442.	9.944	0.000	17.233	159.295	159.285	172.183	1.000	66.443
443.	9.929	0.000	17.448	159.306	159.296	173.066	1.000	67.318
444.	9.917	0.000	17.663	159.316	159.306	173.952	1.000	68.197
445.	9.906	0.000	17.877	159.325	159.315	174.842	1.000	69.079
446.	9.896	0.000	18.090	159.332	159.323	175.735	1.000	69.964
447.	9.889	0.000	18.303	159.338	159.328	176.631	1.000	70.852
448.	9.883	0.000	18.515	159.342	159.333	177.530	1.000	71.743
449.	9.879	0.000	18.726	159.345	159.336	178.431	1.000	72.637
450.	9.876	0.000	18.937	159.347	159.338	179.334	1.000	73.532
451.	(3) 9.876	0.239	19.371	159.347	159.338	180.000	1.000	74.430
452.	9.877	1.146	20.432	159.345	159.337	180.000	1.000	75.329
453.	9.881	2.054	21.499	159.343	159.335	180.000	1.000	76.230
454.	9.886	2.964	22.569	159.339	159.331	180.000	1.000	77.132
455.	9.893	3.874	23.642	159.333	159.325	180.000	1.000	78.034
456.	9.901	4.785	24.718	159.326	159.318	180.000	1.000	78.937
457.	9.912	5.696	25.795	159.317	159.310	180.000	1.000	79.841
458.	9.924	6.608	26.874	159.307	159.300	180.000	1.000	80.744
459.	9.939	7.519	27.954	159.296	159.289	180.000	1.000	81.647
460.	9.955	8.429	29.033	159.282	159.276	180.000	1.000	82.550
461.	9.973	9.339	30.113	159.268	159.261	180.000	1.000	83.452
462.	9.993	10.247	31.191	159.252	159.245	180.000	1.000	84.353
463.	10.015	11.155	32.269	159.234	159.228	180.000	1.000	85.252
464.	10.039	12.061	33.345	159.215	159.209	180.000	1.000	86.150
465.	10.064	12.965	34.419	159.194	159.188	180.000	1.000	87.046
466.	10.092	13.866	35.491	159.171	159.166	180.000	1.000	87.939
467.	10.121	14.766	36.560	159.147	159.142	180.000	1.000	88.831
468.	10.152	15.663	37.627	159.122	159.116	180.000	1.000	89.720

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Collector fully stowed at 0 deg, fully deployed at 180 deg.
3. Attitude mode change

Table 12-2 ISP #2 Collection Period Characteristics

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	collector angle (deg) (2)	grid exposure	beta angle (deg)
1266.	14.846	0.000	2.783	165.723	158.126	117.126	0.493	14.733
1267.	14.780	0.000	2.307	168.377	158.250	117.418	0.508	14.983
1268.	14.713	0.000	1.837	172.347	158.373	117.712	0.524	15.238
1269.	14.647	0.000	1.378	178.941	158.493	118.009	0.540	15.496
1270.	14.581	0.000	0.952	168.335	158.611	118.308	0.556	15.758
1271.	14.516	0.000	0.634	139.805	158.727	118.610	0.572	16.023
1272.	14.450	0.000	0.625	86.896	158.841	118.915	0.588	16.292
1273.	14.384	0.000	0.936	116.534	158.954	119.222	0.604	16.564
1274.	14.319	0.000	1.364	129.719	159.065	119.532	0.621	16.841
1275.	14.253	0.000	1.828	136.488	159.173	119.844	0.637	17.120
1276.	14.188	0.000	2.307	140.531	159.281	120.159	0.654	17.403
1277.	14.122	0.000	2.793	143.215	159.386	120.478	0.671	17.690
1278.	14.057	0.000	3.281	145.133	159.490	120.798	0.687	17.981
1279.	13.992	0.000	3.771	146.579	159.592	121.122	0.704	18.275
1280.	13.927	0.000	4.262	147.715	159.693	121.449	0.720	18.572
1281.	13.863	0.000	4.751	148.636	159.792	121.778	0.737	18.873
1282.	13.798	0.000	5.239	149.402	159.889	122.111	0.754	19.178
1283.	13.733	0.000	5.725	150.053	159.985	122.447	0.770	19.487
1284.	13.669	0.000	6.209	150.615	160.080	122.785	0.787	19.799
1285.	13.604	0.000	6.690	151.109	160.172	123.127	0.803	20.115
1286.	13.540	0.000	7.168	151.547	160.264	123.472	0.819	20.434
1287.	13.476	0.000	7.642	151.940	160.354	123.820	0.835	20.757
1288.	13.412	0.000	8.113	152.297	160.443	124.172	0.851	21.084
1289.	13.349	0.000	8.579	152.623	160.530	124.527	0.866	21.415
1290.	13.285	0.000	9.041	152.923	160.616	124.885	0.881	21.749
1291.	13.222	0.000	9.499	153.201	160.700	125.246	0.896	22.087
1292.	13.158	0.000	9.952	153.459	160.783	125.611	0.910	22.429
1293.	13.095	0.000	10.400	153.701	160.865	125.979	0.924	22.775
1294.	13.032	0.000	10.842	153.929	160.946	126.351	0.937	23.125
1295.	12.970	0.000	11.279	154.144	161.025	126.727	0.950	23.479
1296.	12.907	0.000	11.710	154.348	161.103	127.106	0.962	23.837
1297.	12.845	0.000	12.136	154.541	161.180	127.489	0.973	24.198
1298.	12.783	0.000	12.555	154.726	161.256	127.875	0.982	24.564
1299.	12.721	0.000	12.968	154.902	161.330	128.265	0.991	24.934
1300.	12.659	0.000	13.374	155.071	161.404	128.659	0.997	25.308
1301.	12.598	0.000	13.774	155.233	161.476	129.057	1.000	25.686
1302.	12.536	0.000	14.168	155.389	161.547	129.459	1.000	26.068
1303.	12.475	0.000	14.554	155.540	161.617	129.865	1.000	26.454
1304.	12.414	0.000	14.933	155.685	161.686	130.275	1.000	26.845
1305.	12.354	0.000	15.306	155.825	161.753	130.689	1.000	27.240
1306.	12.293	0.000	15.671	155.961	161.820	131.108	1.000	27.640
1307.	12.233	0.000	16.029	156.093	161.885	131.530	1.000	28.044
1308.	12.174	0.000	16.379	156.220	161.950	131.957	1.000	28.452
1309.	12.114	0.000	16.722	156.345	162.013	132.388	1.000	28.865
1310.	12.055	0.000	17.057	156.465	162.076	132.823	1.000	29.282
1311.	11.996	0.000	17.385	156.583	162.137	133.263	1.000	29.704
1312.	11.937	0.000	17.705	156.697	162.197	133.708	1.000	30.131
1313.	11.879	0.000	18.017	156.809	162.257	134.157	1.000	30.562
1314.	11.821	0.000	18.322	156.918	162.315	134.610	1.000	30.998
1315.	11.763	0.000	18.619	157.025	162.373	135.069	1.000	31.439
1316.	11.706	0.000	18.909	157.129	162.429	135.532	1.000	31.885
1317.	11.649	0.000	19.191	157.230	162.485	135.999	1.000	32.335
1318.	11.592	0.000	19.465	157.330	162.539	136.472	1.000	32.791
1319.	11.536	0.000	19.732	157.428	162.593	136.950	1.000	33.251
1320.	11.480	0.000	19.991	157.523	162.646	137.432	1.000	33.717
1321.	11.424	0.000	20.242	157.617	162.697	137.920	1.000	34.188
1322.	11.369	0.000	20.487	157.709	162.748	138.413	1.000	34.664
1323.	11.314	0.000	20.723	157.799	162.798	138.910	1.000	35.145
1324.	11.260	0.000	20.952	157.888	162.847	139.414	1.000	35.631
1325.	11.206	0.000	21.174	157.974	162.895	139.922	1.000	36.123
1326.	11.152	0.000	21.389	158.060	162.943	140.436	1.000	36.620
1327.	11.099	0.000	21.596	158.144	162.989	140.955	1.000	37.123
1328.	11.047	0.000	21.797	158.226	163.035	141.479	1.000	37.631
1329.	10.994	0.000	21.990	158.307	163.080	142.009	1.000	38.144
1330.	10.943	0.000	22.176	158.387	163.123	142.545	1.000	38.663
1331.	10.892	0.000	22.355	158.465	163.167	143.086	1.000	39.188
1332.	10.841	0.000	22.527	158.542	163.209	143.633	1.000	39.719
1333.	10.791	0.000	22.692	158.618	163.250	144.185	1.000	40.255
1334.	10.741	0.000	22.850	158.693	163.291	144.744	1.000	40.797
1335.	10.692	0.000	23.002	158.767	163.330	145.308	1.000	41.345

1336. 10.644 0.000 23.147 158.839 163.369 145.878 1.000 41.898  
 1337. 10.596 0.000 23.285 158.910 163.407 146.454 1.000 42.458

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Collector fully stowed at 0 deg, fully deployed at 180 deg.

Table 12-2 ISP #2 Collection Period Characteristics (cont)

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	collector angle (deg) (2)	grid exposure	beta angle (deg)
1338.	10.549	0.000	23.416	158.981	163.445	147.035	1.000	43.023
1339.	10.502	0.000	23.542	159.050	163.481	147.623	1.000	43.595
1340.	10.456	0.000	23.660	159.118	163.517	148.217	1.000	44.172
1341.	10.411	0.000	23.773	159.185	163.552	148.817	1.000	44.756
1342.	10.366	0.000	23.879	159.252	163.586	149.423	1.000	45.345
1343.	10.322	0.000	23.979	159.317	163.619	150.035	1.000	45.941
1344.	10.278	0.000	24.073	159.381	163.652	150.654	1.000	46.543
1345.	10.236	0.000	24.162	159.445	163.684	151.278	1.000	47.151
1346.	10.194	0.000	24.244	159.508	163.715	151.909	1.000	47.765
1347.	10.153	0.000	24.321	159.570	163.745	152.546	1.000	48.386
1348.	10.112	0.000	24.392	159.631	163.774	153.189	1.000	49.012
1349.	10.072	0.000	24.457	159.691	163.803	153.839	1.000	49.645
1350.	10.034	0.000	24.518	159.750	163.831	154.494	1.000	50.284
1351.	9.996	0.000	24.572	159.809	163.858	155.157	1.000	50.929
1352.	9.958	0.000	24.622	159.867	163.884	155.825	1.000	51.581
1353.	9.922	0.000	24.666	159.924	163.910	156.500	1.000	52.239
1354.	9.886	0.000	24.705	159.980	163.934	157.181	1.000	52.903
1355.	9.852	0.000	24.739	160.036	163.958	157.868	1.000	53.573
1356.	9.818	0.000	24.768	160.091	163.981	158.561	1.000	54.249
1357.	9.785	0.000	24.792	160.145	164.004	159.261	1.000	54.932
1358.	9.753	0.000	24.812	160.198	164.026	159.967	1.000	55.620
1359.	9.723	0.000	24.826	160.251	164.046	160.679	1.000	56.315
1360.	9.693	0.000	24.836	160.303	164.067	161.397	1.000	57.016
1361.	9.664	0.000	24.842	160.355	164.086	162.121	1.000	57.723
1362.	9.636	0.000	24.843	160.405	164.104	162.852	1.000	58.436
1363.	9.609	0.000	24.839	160.456	164.122	163.588	1.000	59.154
1364.	9.583	0.000	24.831	160.505	164.139	164.330	1.000	59.879
1365.	9.559	0.000	24.819	160.554	164.155	165.078	1.000	60.609
1366.	9.535	0.000	24.802	160.602	164.171	165.832	1.000	61.345
1367.	9.513	0.000	24.781	160.650	164.185	166.592	1.000	62.086
1368.	9.491	0.000	24.756	160.696	164.199	167.357	1.000	62.833
1369.	9.471	0.000	24.727	160.743	164.212	168.127	1.000	63.586
1370.	9.452	0.000	24.694	160.789	164.224	168.903	1.000	64.343
1371.	9.435	0.000	24.658	160.834	164.235	169.685	1.000	65.106
1372.	9.418	0.000	24.617	160.878	164.246	170.471	1.000	65.874
1373.	9.403	0.000	24.573	160.922	164.256	171.263	1.000	66.647
1374.	9.389	0.000	24.525	160.965	164.265	172.059	1.000	67.425
1375.	9.376	0.000	24.473	161.008	164.273	172.861	1.000	68.207
1376.	9.365	0.000	24.418	161.050	164.280	173.667	1.000	68.994
1377.	9.355	0.000	24.360	161.092	164.286	174.477	1.000	69.786
1378.	9.346	0.000	24.298	161.133	164.292	175.292	1.000	70.581
1379.	9.339	0.000	24.233	161.174	164.296	176.111	1.000	71.381
1380.	9.333	0.000	24.164	161.214	164.300	176.934	1.000	72.185
1381.	9.328	0.000	24.093	161.253	164.303	177.761	1.000	72.992
1382.	9.325	0.000	24.018	161.292	164.305	178.592	1.000	73.803
1383.	9.323	0.000	23.940	161.330	164.306	179.426	1.000	74.617
1384.	(3) 9.323	0.263	23.610	161.368	164.306	180.000	1.000	75.434
1385.	9.324	1.104	22.732	161.405	164.306	180.000	1.000	76.254
1386.	9.327	1.947	21.852	161.441	164.304	180.000	1.000	77.078
1387.	9.331	2.793	20.969	161.477	164.301	180.000	1.000	77.903
1388.	9.337	3.642	20.085	161.513	164.298	180.000	1.000	78.731
1389.	9.344	4.492	19.200	161.547	164.293	180.000	1.000	79.561
1390.	9.353	5.345	18.316	161.582	164.288	180.000	1.000	80.393
1391.	9.363	6.200	17.434	161.615	164.281	180.000	1.000	81.227
1392.	9.375	7.056	16.554	161.649	164.274	180.000	1.000	82.062
1393.	9.389	7.914	15.679	161.681	164.265	180.000	1.000	82.899
1394.	9.404	8.773	14.810	161.713	164.256	180.000	1.000	83.736
1395.	9.420	9.633	13.949	161.744	164.245	180.000	1.000	84.575
1396.	9.439	10.494	13.100	161.775	164.233	180.000	1.000	85.413
1397.	9.459	11.355	12.265	161.805	164.221	180.000	1.000	86.253
1398.	9.480	12.216	11.448	161.835	164.207	180.000	1.000	87.092
1399.	9.504	13.078	10.655	161.864	164.192	180.000	1.000	87.931
1400.	9.528	13.939	9.892	161.892	164.176	180.000	1.000	88.770
1401.	9.555	14.800	9.169	161.920	164.158	180.000	1.000	89.608

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Collector fully stowed at 0 deg, fully deployed at 180 deg.
3. Attitude mode change

Table 12-3 ISP #1 Spacecraft Attitude [EME'2000]

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
353.	-10.730	53.047	-70.943	176.317	15.558	140.023
354.	-10.463	53.189	-71.161	175.958	15.486	140.257
355.	-10.200	53.334	-71.375	175.601	15.414	140.490
356.	-9.942	53.480	-71.584	175.245	15.341	140.723
357.	-9.689	53.628	-71.789	174.890	15.268	140.956
358.	-9.441	53.778	-71.989	174.537	15.195	141.189
359.	-9.197	53.929	-72.185	174.186	15.122	141.422
360.	-8.958	54.083	-72.378	173.836	15.048	141.654
361.	-8.723	54.238	-72.566	173.487	14.974	141.886
362.	-8.493	54.395	-72.751	173.140	14.900	142.118
363.	-8.266	54.554	-72.932	172.795	14.826	142.350
364.	-8.044	54.714	-73.110	172.451	14.752	142.581
365.	-7.825	54.876	-73.284	172.108	14.677	142.813
366.	-7.610	55.039	-73.455	171.767	14.602	143.044
367.	-7.399	55.204	-73.623	171.428	14.527	143.275
368.	-7.192	55.370	-73.787	171.091	14.451	143.506
369.	-6.988	55.537	-73.949	170.755	14.376	143.737
370.	-6.788	55.706	-74.108	170.420	14.300	143.968
371.	-6.591	55.876	-74.264	170.088	14.224	144.198
372.	-6.398	56.048	-74.417	169.757	14.148	144.428
373.	-6.208	56.221	-74.568	169.427	14.071	144.659
374. (2)	-6.021	56.395	-74.716	169.100	13.995	144.889
375.	-5.837	56.570	-74.862	168.774	13.918	145.119
376.	-5.657	56.747	-75.005	168.449	13.840	145.348
377.	-5.479	56.924	-75.146	168.127	13.763	145.578
378.	-5.304	57.103	-75.285	167.806	13.685	145.808
379.	-5.133	57.283	-75.422	167.487	13.607	146.037
380.	-4.964	57.464	-75.556	167.170	13.529	146.267
381.	-4.798	57.646	-75.689	166.854	13.451	146.496
382.	-4.634	57.830	-75.819	166.540	13.372	146.726
383.	-4.474	58.014	-75.947	166.228	13.294	146.955
384.	-4.316	58.199	-76.074	165.918	13.215	147.184
385.	-4.160	58.386	-76.199	165.610	13.135	147.413
386.	-4.007	58.573	-76.322	165.303	13.056	147.642
387.	-3.857	58.761	-76.443	164.998	12.976	147.871
388.	-3.709	58.950	-76.563	164.695	12.896	148.100
389.	-3.564	59.141	-76.681	164.394	12.816	148.329
390.	-3.421	59.332	-76.798	164.095	12.736	148.558
391.	-3.280	59.524	-76.913	163.797	12.655	148.787
392.	-3.142	59.717	-77.027	163.502	12.574	149.015
393.	-3.006	59.911	-77.139	163.208	12.493	149.244
394.	-2.872	60.106	-77.250	162.916	12.411	149.473
395.	-2.741	60.301	-77.360	162.626	12.330	149.702
396.	-2.611	60.498	-77.468	162.338	12.248	149.930
397.	-2.484	60.695	-77.576	162.052	12.166	150.159
398.	-2.359	60.893	-77.682	161.768	12.083	150.388
399.	-2.236	61.092	-77.786	161.486	12.001	150.617
400.	-2.115	61.292	-77.890	161.205	11.918	150.846
401.	-1.997	61.493	-77.993	160.927	11.835	151.074
402.	-1.880	61.694	-78.095	160.651	11.752	151.303
403.	-1.765	61.897	-78.195	160.376	11.668	151.532
404.	-1.652	62.100	-78.295	160.104	11.584	151.761
405.	-1.542	62.304	-78.394	159.833	11.500	151.990
406.	-1.433	62.508	-78.492	159.565	11.416	152.219
407.	-1.326	62.714	-78.589	159.299	11.331	152.448
408.	-1.221	62.920	-78.686	159.034	11.246	152.677
409.	-1.118	63.127	-78.781	158.772	11.161	152.907
410.	-1.016	63.335	-78.876	158.512	11.076	153.136
411.	-0.917	63.544	-78.970	158.253	10.990	153.365
412.	-0.819	63.753	-79.064	157.997	10.905	153.595
413.	-0.724	63.963	-79.157	157.743	10.818	153.825
414.	-0.630	64.174	-79.249	157.491	10.732	154.054
415.	-0.537	64.385	-79.341	157.242	10.645	154.284
416.	-0.447	64.597	-79.432	156.994	10.559	154.514
417.	-0.358	64.810	-79.522	156.748	10.471	154.744
418.	-0.271	65.024	-79.612	156.505	10.384	154.974
419.	-0.186	65.238	-79.702	156.264	10.296	155.205
420.	-0.103	65.454	-79.791	156.025	10.208	155.435
421.	-0.021	65.669	-79.880	155.789	10.120	155.666
422.	0.059	65.886	-79.968	155.554	10.032	155.896
423.	0.137	66.103	-80.056	155.322	9.943	156.127

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Actual start at L+374 days

Table 12-3 ISP #1 Spacecraft Attitude [EME'2000] (cont)

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
424.	0.213	66.321	-80.144	155.093	9.854	156.358
425.	0.288	66.540	-80.231	154.865	9.765	156.590
426.	0.361	66.759	-80.318	154.640	9.675	156.821
427.	0.433	66.979	-80.405	154.418	9.585	157.053
428.	0.503	67.200	-80.491	154.198	9.495	157.284
429.	0.571	67.422	-80.577	153.980	9.405	157.516
430.	0.637	67.644	-80.663	153.765	9.314	157.749
431.	0.702	67.867	-80.749	153.552	9.223	157.981
432.	0.765	68.090	-80.835	153.342	9.132	158.214
433.	0.827	68.315	-80.921	153.134	9.041	158.446
434.	0.886	68.540	-81.007	152.929	8.949	158.679
435.	0.945	68.765	-81.092	152.727	8.857	158.913
436.	1.001	68.992	-81.178	152.528	8.765	159.146
437.	1.056	69.219	-81.263	152.331	8.672	159.380
438.	1.109	69.447	-81.349	152.138	8.579	159.614
439.	1.160	69.675	-81.434	151.947	8.486	159.848
440.	1.210	69.904	-81.520	151.759	8.392	160.083
441.	1.258	70.134	-81.605	151.574	8.298	160.318
442.	1.305	70.365	-81.691	151.392	8.204	160.553
443.	1.350	70.596	-81.777	151.214	8.110	160.788
444.	1.393	70.828	-81.863	151.038	8.015	161.024
445.	1.434	71.060	-81.949	150.866	7.920	161.260
446.	1.474	71.294	-82.036	150.698	7.825	161.496
447.	1.512	71.528	-82.122	150.533	7.729	161.733
448.	1.548	71.762	-82.209	150.371	7.634	161.970
449.	1.582	71.998	-82.296	150.214	7.537	162.207
450.	1.615	72.234	-82.384	150.060	7.441	162.445
451. (2)	1.616	72.233	-82.472	149.910	7.351	162.442
452.	1.531	71.571	-82.560	149.764	7.279	161.766
453.	1.446	70.907	-82.648	149.622	7.206	161.090
454.	1.363	70.243	-82.737	149.485	7.132	160.413
455.	1.280	69.578	-82.827	149.352	7.057	159.737
456.	1.198	68.913	-82.917	149.224	6.980	159.060
457.	1.117	68.248	-83.007	149.101	6.902	158.383
458.	1.037	67.584	-83.098	148.983	6.823	157.708
459.	0.958	66.920	-83.189	148.871	6.742	157.033
460.	0.880	66.257	-83.281	148.763	6.660	156.359
461.	0.803	65.595	-83.374	148.662	6.577	155.688
462.	0.728	64.935	-83.467	148.567	6.492	155.017
463.	0.653	64.276	-83.561	148.478	6.406	154.349
464.	0.580	63.619	-83.655	148.395	6.318	153.683
465.	0.508	62.965	-83.750	148.320	6.229	153.020
466.	0.437	62.313	-83.846	148.252	6.138	152.360
467.	0.368	61.663	-83.943	148.192	6.046	151.702
468.	0.300	61.017	-84.041	148.140	5.952	151.048

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-4 ISP #2 Spacecraft Attitude [EME'2000]

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
1266.	-9.490	44.919	-68.747	160.373	18.833	131.651
1267.	-9.320	45.031	-68.860	160.147	18.798	131.829
1268.	-9.153	45.144	-68.972	159.923	18.762	132.007
1269.	-8.987	45.258	-69.082	159.700	18.726	132.185
1270.	-8.823	45.374	-69.190	159.478	18.690	132.364
1271.	-8.661	45.490	-69.297	159.258	18.654	132.542
1272.	-8.500	45.607	-69.402	159.040	18.618	132.721
1273.	-8.342	45.726	-69.506	158.823	18.581	132.900
1274.	-8.184	45.845	-69.608	158.607	18.544	133.080
1275.	-8.029	45.966	-69.709	158.393	18.507	133.259
1276.	-7.875	46.087	-69.809	158.181	18.469	133.439
1277.	-7.723	46.209	-69.907	157.970	18.432	133.619
1278.	-7.572	46.333	-70.004	157.760	18.394	133.799
1279.	-7.423	46.457	-70.100	157.552	18.355	133.980
1280.	-7.275	46.583	-70.194	157.345	18.317	134.160
1281.	-7.129	46.709	-70.288	157.140	18.279	134.341
1282.	-6.985	46.836	-70.380	156.937	18.240	134.522
1283.	-6.841	46.964	-70.471	156.734	18.201	134.703
1284.	-6.700	47.093	-70.561	156.534	18.161	134.885
1285.	-6.559	47.223	-70.649	156.334	18.122	135.067
1286.	-6.420	47.354	-70.737	156.137	18.082	135.249
1287.	-6.282	47.486	-70.824	155.940	18.042	135.431
1288.	-6.146	47.619	-70.909	155.745	18.002	135.613
1289.	-6.011	47.752	-70.994	155.552	17.961	135.796
1290.	-5.877	47.887	-71.078	155.359	17.920	135.979
1291.	-5.744	48.022	-71.161	155.169	17.879	136.162
1292.	-5.613	48.158	-71.243	154.979	17.838	136.346
1293.	-5.483	48.295	-71.323	154.791	17.797	136.530
1294.	-5.354	48.433	-71.404	154.605	17.755	136.714
1295.	-5.226	48.572	-71.483	154.420	17.713	136.898
1296.	-5.099	48.712	-71.561	154.236	17.671	137.082
1297.	-4.974	48.852	-71.639	154.054	17.628	137.267
1298.	-4.850	48.993	-71.716	153.873	17.585	137.452
1299.	-4.726	49.135	-71.792	153.693	17.542	137.638
1300.	-4.604	49.278	-71.867	153.515	17.499	137.823
1301.	-4.483	49.422	-71.942	153.338	17.455	138.009
1302.	-4.364	49.567	-72.016	153.162	17.412	138.196
1303.	-4.245	49.712	-72.089	152.988	17.368	138.382
1304.	-4.127	49.859	-72.162	152.815	17.323	138.569
1305.	-4.010	50.006	-72.233	152.644	17.279	138.756
1306.	-3.894	50.154	-72.305	152.474	17.234	138.944
1307.	-3.780	50.302	-72.375	152.305	17.189	139.131
1308.	-3.666	50.452	-72.445	152.137	17.143	139.319
1309.	-3.553	50.602	-72.515	151.971	17.097	139.508
1310.	-3.442	50.753	-72.584	151.806	17.052	139.696
1311.	-3.331	50.905	-72.652	151.643	17.005	139.885
1312.	-3.221	51.058	-72.720	151.481	16.959	140.075
1313.	-3.112	51.212	-72.787	151.320	16.912	140.264
1314.	-3.004	51.366	-72.854	151.160	16.865	140.454
1315.	-2.897	51.521	-72.920	151.002	16.818	140.645
1316.	-2.791	51.677	-72.986	150.845	16.770	140.835
1317.	-2.686	51.834	-73.051	150.690	16.722	141.026
1318.	-2.582	51.992	-73.116	150.536	16.674	141.218
1319.	-2.479	52.150	-73.180	150.383	16.625	141.409
1320.	-2.376	52.309	-73.244	150.231	16.576	141.601
1321.	-2.275	52.469	-73.308	150.081	16.527	141.794
1322.	-2.174	52.630	-73.371	149.932	16.478	141.987
1323.	-2.074	52.792	-73.434	149.784	16.428	142.180
1324.	-1.975	52.954	-73.496	149.638	16.378	142.373
1325.	-1.877	53.117	-73.558	149.493	16.328	142.567
1326.	-1.780	53.281	-73.620	149.349	16.277	142.761
1327.	-1.683	53.446	-73.682	149.206	16.227	142.956
1328.	-1.587	53.612	-73.743	149.065	16.175	143.151
1329.	-1.493	53.778	-73.803	148.925	16.124	143.347
1330.	-1.399	53.946	-73.864	148.787	16.072	143.543
1331.	-1.306	54.114	-73.924	148.650	16.020	143.739
1332.	-1.213	54.283	-73.984	148.514	15.968	143.935
1333.	-1.122	54.452	-74.044	148.379	15.915	144.133
1334.	-1.031	54.623	-74.103	148.246	15.862	144.330
1335.	-0.941	54.794	-74.162	148.114	15.808	144.528
1336.	-0.852	54.967	-74.221	147.983	15.755	144.726

1337.            -0.764    55.140   -74.280   147.854   15.701   144.925

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-4 ISP #2 Spacecraft Attitude [EME'2000] (cont)

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
1338.	-0.676	55.314	-74.338	147.726	15.646	145.124
1339.	-0.589	55.488	-74.397	147.599	15.591	145.324
1340.	-0.503	55.664	-74.455	147.474	15.536	145.524
1341.	-0.418	55.840	-74.513	147.350	15.481	145.724
1342.	-0.334	56.018	-74.571	147.227	15.425	145.925
1343.	-0.250	56.196	-74.628	147.106	15.369	146.127
1344.	-0.167	56.375	-74.686	146.986	15.313	146.329
1345.	-0.085	56.554	-74.743	146.867	15.256	146.531
1346.	-0.004	56.735	-74.801	146.750	15.199	146.734
1347.	0.076	56.917	-74.858	146.634	15.142	146.937
1348.	0.156	57.099	-74.915	146.519	15.084	147.141
1349.	0.235	57.282	-74.972	146.406	15.026	147.345
1350.	0.313	57.466	-75.029	146.295	14.967	147.550
1351.	0.391	57.651	-75.086	146.184	14.909	147.755
1352.	0.467	57.837	-75.143	146.076	14.849	147.961
1353.	0.543	58.024	-75.200	145.968	14.790	148.168
1354.	0.618	58.212	-75.256	145.862	14.730	148.374
1355.	0.692	58.400	-75.313	145.758	14.670	148.582
1356.	0.766	58.590	-75.370	145.654	14.609	148.790
1357.	0.839	58.780	-75.427	145.553	14.548	148.998
1358.	0.911	58.972	-75.484	145.453	14.487	149.207
1359.	0.982	59.164	-75.540	145.354	14.425	149.416
1360.	1.052	59.357	-75.597	145.257	14.363	149.627
1361.	1.121	59.551	-75.654	145.161	14.300	149.837
1362.	1.190	59.746	-75.711	145.067	14.237	150.048
1363.	1.258	59.942	-75.768	144.975	14.174	150.260
1364.	1.325	60.139	-75.825	144.884	14.110	150.472
1365.	1.391	60.337	-75.883	144.795	14.046	150.685
1366.	1.457	60.536	-75.940	144.707	13.981	150.899
1367.	1.522	60.736	-75.997	144.621	13.916	151.113
1368.	1.585	60.936	-76.055	144.537	13.851	151.327
1369.	1.648	61.138	-76.113	144.454	13.785	151.543
1370.	1.711	61.341	-76.170	144.373	13.719	151.759
1371.	1.772	61.545	-76.229	144.294	13.653	151.975
1372.	1.832	61.749	-76.287	144.216	13.586	152.192
1373.	1.892	61.955	-76.345	144.141	13.518	152.410
1374.	1.951	62.162	-76.404	144.067	13.450	152.629
1375.	2.008	62.370	-76.463	143.995	13.382	152.848
1376.	2.065	62.578	-76.522	143.925	13.313	153.067
1377.	2.121	62.788	-76.581	143.856	13.244	153.288
1378.	2.177	62.999	-76.640	143.790	13.175	153.509
1379.	2.231	63.211	-76.700	143.726	13.105	153.731
1380.	2.284	63.424	-76.760	143.664	13.034	153.953
1381.	2.336	63.638	-76.821	143.603	12.963	154.176
1382.	2.388	63.853	-76.881	143.545	12.892	154.400
1383.	2.438	64.069	-76.943	143.490	12.820	154.624
1384.	(2) 2.430	64.030	-77.004	143.436	12.759	154.580
1385.	2.293	63.427	-77.066	143.384	12.722	153.945
1386.	2.157	62.823	-77.128	143.335	12.684	153.309
1387.	2.021	62.217	-77.190	143.288	12.644	152.671
1388.	1.885	61.609	-77.253	143.244	12.602	152.031
1389.	1.749	61.000	-77.316	143.202	12.558	151.390
1390.	1.613	60.389	-77.380	143.163	12.513	150.748
1391.	1.478	59.778	-77.444	143.126	12.466	150.105
1392.	1.343	59.166	-77.509	143.092	12.416	149.462
1393.	1.208	58.553	-77.574	143.060	12.365	148.818
1394.	1.074	57.940	-77.640	143.032	12.312	148.174
1395.	0.941	57.327	-77.706	143.006	12.257	147.531
1396.	0.808	56.713	-77.773	142.983	12.200	146.888
1397.	0.676	56.101	-77.840	142.964	12.141	146.246
1398.	0.544	55.488	-77.908	142.947	12.080	145.605
1399.	0.414	54.877	-77.976	142.934	12.017	144.965
1400.	0.284	54.266	-78.045	142.924	11.951	144.326
1401.	0.156	53.657	-78.115	142.918	11.884	143.690

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Attitude mode change

Table 12-5 CIDA #1 Collection Period Characteristics

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	+x-off ISP (deg)	fov exposure
45.	58.645	15.710	59.851	176.800	176.480	0.000	0.766
46.	58.525	16.276	59.134	176.791	176.463	0.000	0.766
47.	58.402	16.838	58.412	176.781	176.445	0.000	0.766
48.	58.275	17.396	57.685	176.772	176.427	0.000	0.766
49.	58.146	17.950	56.953	176.762	176.408	0.000	0.766
50.	58.014	18.500	56.218	176.752	176.388	0.000	0.766
51.	57.879	19.046	55.478	176.742	176.368	0.000	0.766
52.	57.742	19.588	54.735	176.733	176.347	0.000	0.766
53.	57.602	20.126	53.989	176.723	176.326	0.000	0.766
54. (2)	57.459	20.000	52.581	176.713	176.304	0.660	0.759
55.	57.314	20.000	51.301	176.704	176.282	1.189	0.753
56.	57.167	20.000	50.024	176.695	176.258	1.715	0.746
57.	57.018	20.000	48.749	176.687	176.235	2.237	0.740
58.	56.867	20.000	47.479	176.679	176.211	2.754	0.734
59.	56.714	20.000	46.212	176.672	176.186	3.268	0.728
60.	56.559	20.000	44.950	176.666	176.161	3.778	0.722
61.	56.402	20.000	43.693	176.661	176.135	4.283	0.716
62.	56.243	20.000	42.443	176.657	176.108	4.785	0.710
63.	56.083	20.000	41.199	176.656	176.081	5.283	0.704
64.	55.921	20.000	39.963	176.657	176.054	5.777	0.697
65.	55.758	20.000	38.735	176.660	176.025	6.267	0.691
66.	55.593	20.000	37.517	176.668	175.997	6.753	0.685
67.	55.427	20.000	36.308	176.679	175.967	7.236	0.679
68.	55.260	20.000	35.109	176.697	175.937	7.714	0.673
69.	55.091	20.000	33.922	176.721	175.907	8.189	0.667
70.	54.921	20.000	32.748	176.754	175.876	8.661	0.661
71.	54.751	20.000	31.586	176.798	175.844	9.128	0.654
72.	54.579	20.000	30.437	176.858	175.812	9.592	0.648
73.	54.406	20.000	29.304	176.938	175.780	10.052	0.642
74.	54.233	20.000	28.184	177.046	175.746	10.509	0.636
75.	54.059	20.000	27.080	177.196	175.712	10.962	0.630
76.	53.883	20.000	25.992	177.408	175.678	11.412	0.624
77.	53.708	20.000	24.920	177.722	175.643	11.858	0.618
78.	53.531	20.000	23.864	178.219	175.607	12.300	0.612
79.	53.354	20.000	22.825	179.095	175.571	12.739	0.605
80.	53.177	20.000	21.803	179.019	175.534	13.175	0.599
81.	52.998	20.000	20.798	172.405	175.497	13.608	0.593
82.	52.820	20.000	19.810	136.432	175.459	14.037	0.587
83.	52.641	20.000	18.840	167.530	175.420	14.463	0.581
84.	52.461	20.000	17.887	171.076	175.381	14.885	0.575
85.	52.282	20.000	16.952	172.398	175.341	15.305	0.569
86.	52.102	20.000	16.036	173.073	175.300	15.721	0.563
87.	51.921	20.000	15.137	173.474	175.259	16.134	0.557
88.	51.741	20.000	14.257	173.732	175.217	16.544	0.551
89.	51.560	20.000	13.395	173.907	175.175	16.951	0.545
90.	51.379	20.000	12.552	174.028	175.132	17.355	0.539
91.	51.198	20.000	11.727	174.113	175.088	17.756	0.534
92.	51.017	20.000	10.922	174.172	175.044	18.154	0.528
93.	50.836	20.000	10.135	174.211	174.999	18.549	0.522
94.	50.655	20.000	9.369	174.237	174.953	18.942	0.516
95.	50.474	20.000	8.622	174.250	174.907	19.331	0.510
96.	50.293	20.000	7.896	174.255	174.860	19.718	0.504
97.	50.111	20.000	7.191	174.252	174.812	20.102	0.498
98.	49.930	20.000	6.509	174.242	174.764	20.483	0.493
99.	49.749	20.000	5.851	174.228	174.715	20.861	0.487
100.	49.569	20.000	5.219	174.208	174.665	21.237	0.481
101.	49.388	20.000	4.616	174.185	174.615	21.610	0.475
102.	49.207	20.000	4.046	174.159	174.563	21.981	0.470
103.	49.027	20.000	3.518	174.129	174.511	22.349	0.464
104.	48.847	20.000	3.041	174.097	174.459	22.714	0.458
105.	48.667	20.000	2.632	174.062	174.405	23.077	0.453
106.	48.487	20.000	2.316	174.025	174.351	23.438	0.447
107.	48.308	20.000	2.120	173.986	174.296	23.796	0.442
108.	48.128	20.000	2.068	173.944	174.240	24.151	0.436
109.	47.949	20.000	2.157	173.902	174.183	24.505	0.430
110.	47.771	20.000	2.363	173.857	174.126	24.856	0.425
111.	47.592	20.000	2.649	173.811	174.068	25.204	0.419
112.	47.414	20.000	2.986	173.763	174.009	25.551	0.414
113.	47.237	20.000	3.353	173.713	173.949	25.895	0.408
114.	47.059	20.000	3.736	173.663	173.888	26.237	0.403

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Attitude mode change

Table 12-5 CIDA #1 Collection Period Characteristics (cont)

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	+x-off ISP (deg)	fov exposure
115.	46.882	20.000	4.125	173.610	173.826	26.577	0.398
116.	46.705	20.000	4.517	173.557	173.764	26.915	0.392
117.	46.529	20.000	4.906	173.502	173.700	27.250	0.387
118.	46.353	20.000	5.291	173.445	173.636	27.584	0.381
119.	46.178	20.000	5.670	173.387	173.571	27.915	0.376
120.	46.002	20.000	6.042	173.328	173.504	28.245	0.371
121.	45.828	20.000	6.406	173.268	173.437	28.572	0.365
122.	45.653	20.000	6.762	173.206	173.369	28.898	0.360
123.	45.479	20.000	7.109	173.143	173.300	29.221	0.355
124.	45.306	20.000	7.447	173.078	173.230	29.543	0.350
125.	45.133	20.000	7.775	173.013	173.159	29.862	0.344
126.	44.960	20.000	8.095	172.946	173.086	30.180	0.339
127.	44.788	20.000	8.405	172.877	173.013	30.496	0.334
128.	44.616	20.000	8.707	172.808	172.939	30.810	0.329
129.	44.445	20.000	8.999	172.737	172.863	31.123	0.324
130.	44.274	20.000	9.282	172.665	172.787	31.434	0.318
131.	44.104	20.000	9.556	172.591	172.709	31.742	0.313
132.	43.934	20.000	9.821	172.516	172.630	32.050	0.308
133.	43.764	20.000	10.078	172.440	172.550	32.355	0.303
134.	43.595	20.000	10.327	172.363	172.469	32.659	0.298
135.	43.427	20.000	10.567	172.284	172.386	32.961	0.293
136.	43.259	20.000	10.799	172.204	172.303	33.262	0.288
137.	43.091	20.000	11.023	172.122	172.218	33.561	0.283
138.	42.924	20.000	11.239	172.039	172.132	33.858	0.278
139.	42.758	20.000	11.448	171.955	172.044	34.154	0.273
140.	42.591	20.000	11.649	171.869	171.955	34.449	0.268
141.	42.426	20.000	11.843	171.782	171.865	34.741	0.263
142.	42.261	20.000	12.030	171.693	171.773	35.033	0.258
143.	42.096	20.000	12.210	171.603	171.680	35.323	0.253
144.	41.932	20.000	12.383	171.511	171.585	35.611	0.249

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-6 CIDA #2 Collection Period Characteristics

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	+x-off ISP (deg)	fov exposure
768.	57.051	15.411	29.556	130.310	177.372	0.000	0.766
769.	56.958	15.874	28.943	127.742	177.362	0.000	0.766
770.	56.863	16.333	28.339	124.964	177.351	0.000	0.766
771.	56.767	16.787	27.742	121.964	177.340	0.000	0.766
772.	56.669	17.237	27.155	118.732	177.329	0.000	0.766
773.	56.569	17.683	26.576	115.266	177.318	0.000	0.766
774.	56.468	18.125	26.006	111.565	177.307	0.000	0.766
775.	56.366	18.562	25.447	107.641	177.295	0.000	0.766
776.	56.263	18.995	24.897	103.514	177.283	0.000	0.766
777.	56.158	19.424	24.358	99.213	177.271	0.000	0.766
778.	56.052	19.848	23.830	94.778	177.258	0.000	0.766
779.	55.945	20.000	23.081	89.740	177.246	0.269	0.763
780.	55.837	20.000	22.222	94.287	177.233	0.686	0.758
781.	55.728	20.000	21.381	98.806	177.220	1.099	0.754
782.	55.617	20.000	20.561	103.241	177.207	1.508	0.749
783.	55.507	20.000	19.761	107.544	177.193	1.913	0.744
784.	55.395	20.000	18.982	111.674	177.179	2.314	0.739
785.	55.282	20.000	18.224	115.601	177.165	2.712	0.735
786.	55.169	20.000	17.488	119.306	177.151	3.105	0.730
787.	55.055	20.000	16.774	122.779	177.137	3.496	0.725
788.	54.940	20.000	16.082	126.019	177.123	3.882	0.721
789.	54.825	20.000	15.413	129.028	177.108	4.265	0.716
790.	54.709	20.000	14.768	131.817	177.093	4.644	0.711
791.	54.593	20.000	14.146	134.397	177.078	5.020	0.707
792.	54.476	20.000	13.549	136.781	177.063	5.393	0.702
793.	54.359	20.000	12.977	138.983	177.047	5.762	0.698
794.	54.241	20.000	12.430	141.019	177.032	6.128	0.693
795.	54.123	20.000	11.910	142.900	177.016	6.491	0.688
796.	54.005	20.000	11.418	144.641	177.000	6.850	0.684
797.	53.886	20.000	10.953	146.254	176.984	7.206	0.679
798.	53.767	20.000	10.517	147.750	176.967	7.559	0.675
799.	53.647	20.000	10.110	149.139	176.951	7.909	0.670
800.	53.528	20.000	9.734	150.431	176.934	8.256	0.666
801.	53.408	20.000	9.389	151.634	176.917	8.599	0.661
802.	53.288	20.000	9.076	152.757	176.900	8.940	0.657
803.	53.168	20.000	8.795	153.806	176.883	9.278	0.652
804.	53.048	20.000	8.547	154.788	176.865	9.613	0.648
805.	52.927	20.000	8.331	155.708	176.848	9.945	0.644
806.	52.807	20.000	8.147	156.571	176.830	10.274	0.639
807.	52.686	20.000	7.995	157.382	176.812	10.601	0.635
808.	52.565	20.000	7.875	158.146	176.794	10.925	0.630
809.	52.445	20.000	7.784	158.865	176.776	11.246	0.626
810.	52.324	20.000	7.722	159.544	176.757	11.564	0.622
811.	52.203	20.000	7.687	160.186	176.739	11.880	0.617
812.	52.083	20.000	7.676	160.793	176.720	12.193	0.613
813.	51.962	20.000	7.689	161.368	176.701	12.504	0.609
814.	51.841	20.000	7.723	161.913	176.682	12.812	0.604
815.	51.721	20.000	7.775	162.431	176.663	13.117	0.600
816.	51.600	20.000	7.844	162.923	176.643	13.421	0.596
817.	51.480	20.000	7.927	163.391	176.624	13.721	0.592
818.	51.360	20.000	8.023	163.837	176.604	14.020	0.588
819.	51.240	20.000	8.130	164.262	176.584	14.316	0.583
820.	51.120	20.000	8.245	164.668	176.564	14.610	0.579
821.	51.000	20.000	8.368	165.056	176.543	14.901	0.575
822.	50.880	20.000	8.497	165.426	176.523	15.191	0.571
823.	50.760	20.000	8.631	165.781	176.502	15.478	0.567
824.	50.641	20.000	8.768	166.121	176.482	15.762	0.563
825.	50.521	20.000	8.907	166.446	176.461	16.045	0.559
826.	50.402	20.000	9.048	166.758	176.439	16.326	0.554
827.	50.283	20.000	9.190	167.057	176.418	16.604	0.550
828.	50.165	20.000	9.331	167.345	176.397	16.881	0.546
829.	50.046	20.000	9.472	167.621	176.375	17.155	0.542
830.	49.928	20.000	9.611	167.887	176.353	17.428	0.538
831.	49.810	20.000	9.748	168.142	176.331	17.698	0.534
832.	49.692	20.000	9.883	168.388	176.309	17.967	0.530
833.	49.574	20.000	10.016	168.625	176.287	18.233	0.526
834.	49.457	20.000	10.145	168.853	176.264	18.498	0.523
835.	49.340	20.000	10.271	169.073	176.242	18.761	0.519
836.	49.223	20.000	10.393	169.285	176.219	19.022	0.515
837.	49.106	20.000	10.512	169.489	176.196	19.281	0.511
838.	48.990	20.000	10.626	169.687	176.173	19.539	0.507
839.	48.874	20.000	10.736	169.877	176.149	19.794	0.503
840.	48.758	20.000	10.842	170.061	176.126	20.048	0.499

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-6 CIDA #2 Collection Period Characteristics (cont)

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	+x-off ISP (deg)	fov exposure
841.	48.642	20.000	10.944	170.239	176.102	20.301	0.495
842.	48.527	20.000	11.042	170.411	176.078	20.551	0.492
843.	48.412	20.000	11.135	170.578	176.054	20.800	0.488
844.	48.297	20.000	11.223	170.739	176.030	21.047	0.484
845.	48.182	20.000	11.307	170.894	176.005	21.293	0.480
846.	48.068	20.000	11.387	171.045	175.981	21.537	0.477
847.	47.954	20.000	11.462	171.191	175.956	21.780	0.473
848.	47.841	20.000	11.533	171.332	175.931	22.021	0.469
849.	47.727	20.000	11.600	171.469	175.906	22.260	0.465
850.	47.614	20.000	11.662	171.602	175.881	22.498	0.462
851.	47.501	20.000	11.720	171.730	175.855	22.734	0.458
852.	47.389	20.000	11.773	171.855	175.829	22.969	0.454
853.	47.277	20.000	11.823	171.976	175.803	23.203	0.451
854.	47.165	20.000	11.867	172.093	175.777	23.435	0.447
855.	47.053	20.000	11.908	172.207	175.751	23.665	0.444
856.	46.942	20.000	11.945	172.317	175.725	23.895	0.440
857.	46.831	20.000	11.977	172.424	175.698	24.122	0.436
858.	46.720	20.000	12.005	172.528	175.671	24.349	0.433
859.	46.610	20.000	12.029	172.629	175.644	24.574	0.429
860.	46.500	20.000	12.049	172.727	175.617	24.798	0.426
861.	46.390	20.000	12.065	172.822	175.589	25.021	0.422
862.	46.281	20.000	12.077	172.914	175.561	25.242	0.419
863.	46.171	20.000	12.085	173.003	175.534	25.462	0.415
864.	46.062	20.000	12.089	173.090	175.506	25.681	0.412
865.	45.954	20.000	12.089	173.174	175.477	25.898	0.408
866.	45.846	20.000	12.085	173.256	175.449	26.115	0.405
867.	45.738	20.000	12.077	173.335	175.420	26.330	0.401
868.	45.630	20.000	12.066	173.413	175.391	26.544	0.398
869.	45.523	20.000	12.051	173.487	175.362	26.757	0.395
870.	45.416	20.000	12.032	173.560	175.333	26.968	0.391
871.	45.309	20.000	12.010	173.631	175.303	27.179	0.388
872.	45.202	20.000	11.984	173.699	175.273	27.388	0.384
873.	45.096	20.000	11.955	173.765	175.243	27.597	0.381
874.	44.990	20.000	11.923	173.830	175.213	27.804	0.378
875.	44.885	20.000	11.887	173.893	175.182	28.010	0.374
876.	44.780	20.000	11.848	173.953	175.152	28.215	0.371
877.	44.675	20.000	11.806	174.012	175.121	28.419	0.368
878.	44.570	20.000	11.760	174.069	175.090	28.622	0.365
879.	44.466	20.000	11.712	174.125	175.058	28.824	0.361
880.	44.362	20.000	11.661	174.178	175.027	29.025	0.358
881.	44.258	20.000	11.606	174.230	174.995	29.225	0.355
882.	44.154	20.000	11.549	174.281	174.963	29.424	0.351
883.	44.051	20.000	11.489	174.329	174.930	29.622	0.348
884.	43.948	20.000	11.426	174.377	174.898	29.819	0.345
885.	43.846	20.000	11.360	174.422	174.865	30.015	0.342
886.	43.743	20.000	11.291	174.467	174.832	30.210	0.339
887.	43.641	20.000	11.220	174.509	174.798	30.404	0.335
888.	43.540	20.000	11.146	174.551	174.765	30.598	0.332
889.	43.438	20.000	11.069	174.591	174.731	30.790	0.329
890.	43.337	20.000	10.990	174.629	174.696	30.982	0.326
891.	43.236	20.000	10.908	174.667	174.662	31.172	0.323
892.	43.135	20.000	10.823	174.703	174.627	31.362	0.320
893.	43.035	20.000	10.736	174.737	174.592	31.551	0.316
894.	42.935	20.000	10.646	174.771	174.557	31.739	0.313
895.	42.835	20.000	10.554	174.803	174.522	31.926	0.310
896.	42.736	20.000	10.460	174.834	174.486	32.113	0.307
897.	42.637	20.000	10.363	174.864	174.450	32.298	0.304
898.	42.538	20.000	10.263	174.892	174.413	32.483	0.301
899.	42.439	20.000	10.162	174.920	174.377	32.667	0.298
900.	42.341	20.000	10.058	174.946	174.340	32.851	0.295
901.	42.243	20.000	9.952	174.971	174.303	33.033	0.292
902.	42.145	20.000	9.844	174.995	174.265	33.215	0.289
903.	42.047	20.000	9.733	175.018	174.227	33.396	0.286
904.	41.950	20.000	9.621	175.040	174.189	33.576	0.283
905.	41.853	20.000	9.507	175.061	174.150	33.756	0.280
906.	41.756	20.000	9.390	175.081	174.112	33.934	0.277
907.	41.659	20.000	9.272	175.099	174.073	34.113	0.274
908.	41.563	20.000	9.152	175.117	174.033	34.290	0.271
909.	41.467	20.000	9.030	175.134	173.993	34.467	0.268
910.	41.371	20.000	8.906	175.149	173.953	34.643	0.265
911.	41.276	20.000	8.780	175.164	173.913	34.818	0.262
912.	41.180	20.000	8.653	175.178	173.872	34.992	0.259
913.	41.085	20.000	8.523	175.191	173.831	35.166	0.256

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-7 CIDA #3 Collection Period Characteristics

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	+x-off ISP (deg)	fov exposure
1702.	55.650	20.000	21.719	135.685	177.213	1.338	0.751
1703.	55.538	20.000	21.839	137.545	177.200	1.745	0.746
1704.	55.426	20.000	21.961	139.310	177.186	2.149	0.741
1705.	55.313	20.000	22.086	140.981	177.172	2.549	0.737
1706.	55.200	20.000	22.213	142.564	177.158	2.945	0.732
1707.	55.085	20.000	22.342	144.061	177.144	3.338	0.727
1708.	54.970	20.000	22.474	145.476	177.130	3.727	0.723
1709.	54.855	20.000	22.608	146.815	177.115	4.112	0.718
1710.	54.738	20.000	22.743	148.081	177.100	4.494	0.713
1711.	54.621	20.000	22.882	149.278	177.085	4.873	0.709
1712.	54.504	20.000	23.022	150.411	177.070	5.248	0.704
1713.	54.386	20.000	23.164	151.483	177.054	5.619	0.699
1714.	54.268	20.000	23.308	152.497	177.039	5.988	0.695
1715.	54.149	20.000	23.454	153.458	177.023	6.353	0.690
1716.	54.030	20.000	23.601	154.369	177.007	6.714	0.686
1717.	53.910	20.000	23.751	155.233	176.991	7.073	0.681
1718.	53.790	20.000	23.902	156.052	176.974	7.428	0.677
1719.	53.670	20.000	24.055	156.830	176.958	7.781	0.672
1720.	53.550	20.000	24.209	157.569	176.941	8.130	0.667
1721.	53.429	20.000	24.366	158.272	176.924	8.476	0.663
1722.	53.309	20.000	24.523	158.940	176.907	8.819	0.658
1723.	53.188	20.000	24.682	159.577	176.890	9.159	0.654
1724.	53.066	20.000	24.842	160.183	176.872	9.496	0.649
1725.	52.945	20.000	25.004	160.760	176.855	9.831	0.645
1726.	52.824	20.000	25.167	161.311	176.837	10.163	0.641
1727.	52.702	20.000	25.331	161.837	176.819	10.491	0.636
1728.	52.581	20.000	25.497	162.340	176.801	10.817	0.632
1729.	52.459	20.000	25.663	162.820	176.782	11.141	0.627
1730.	52.337	20.000	25.831	163.280	176.764	11.461	0.623
1731.	52.216	20.000	26.000	163.719	176.745	11.779	0.619
1732.	52.094	20.000	26.170	164.141	176.726	12.095	0.614
1733.	51.972	20.000	26.341	164.544	176.707	12.408	0.610
1734.	51.850	20.000	26.513	164.932	176.688	12.718	0.606
1735.	51.729	20.000	26.685	165.303	176.669	13.026	0.601
1736.	51.607	20.000	26.859	165.660	176.649	13.331	0.597
1737.	51.486	20.000	27.034	166.002	176.630	13.635	0.593
1738.	51.364	20.000	27.209	166.332	176.610	13.935	0.589
1739.	51.243	20.000	27.385	166.649	176.590	14.233	0.584
1740.	51.122	20.000	27.562	166.953	176.570	14.529	0.580
1741.	51.001	20.000	27.740	167.247	176.549	14.823	0.576
1742.	50.880	20.000	27.919	167.529	176.529	15.114	0.572
1743.	50.759	20.000	28.098	167.802	176.508	15.404	0.568
1744.	50.639	20.000	28.278	168.064	176.487	15.691	0.564
1745.	50.518	20.000	28.459	168.317	176.466	15.976	0.560
1746.	50.398	20.000	28.640	168.562	176.445	16.258	0.555

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-8 CIDA #1 Spacecraft Attitude [EME'2000]

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
45.	-19.836	262.634	-70.068	88.497	-1.877	353.311
46.	-19.849	263.069	-70.074	88.314	-1.679	353.675
47.	-19.861	263.500	-70.079	88.131	-1.482	354.036
48.	-19.871	263.928	-70.083	87.947	-1.287	354.393
49.	-19.880	264.353	-70.087	87.764	-1.092	354.748
50.	-19.887	264.773	-70.090	87.580	-0.899	355.098
51.	-19.893	265.190	-70.093	87.396	-0.706	355.446
52.	-19.898	265.603	-70.095	87.212	-0.515	355.790
53.	-19.901	266.013	-70.096	87.027	-0.325	356.130
54. (2)	-19.903	267.120	-70.097	86.843	0.089	357.088
55.	-19.897	268.085	-70.097	86.658	0.457	357.920
56.	-19.885	269.043	-70.097	86.473	0.822	358.745
57.	-19.866	269.991	-70.096	86.287	1.185	359.563
58.	-19.841	270.932	-70.094	86.101	1.545	0.374
59.	-19.809	271.864	-70.092	85.915	1.903	1.179
60.	-19.772	272.788	-70.089	85.729	2.257	1.976
61.	-19.729	273.704	-70.085	85.543	2.609	2.767
62.	-19.679	274.611	-70.081	85.356	2.957	3.552
63.	-19.625	275.509	-70.077	85.169	3.303	4.330
64.	-19.564	276.399	-70.071	84.982	3.645	5.102
65.	-19.499	277.281	-70.066	84.794	3.985	5.867
66.	-19.428	278.154	-70.059	84.606	4.321	6.627
67.	-19.352	279.018	-70.052	84.418	4.654	7.380
68.	-19.272	279.874	-70.044	84.230	4.984	8.127
69.	-19.186	280.721	-70.036	84.041	5.311	8.868
70.	-19.096	281.560	-70.027	83.852	5.634	9.603
71.	-19.002	282.391	-70.018	83.663	5.955	10.333
72.	-18.903	283.213	-70.008	83.473	6.272	11.056
73.	-18.800	284.027	-69.997	83.283	6.586	11.774
74.	-18.693	284.832	-69.986	83.093	6.896	12.487
75.	-18.582	285.629	-69.974	82.902	7.204	13.194
76.	-18.467	286.418	-69.962	82.711	7.508	13.895
77.	-18.348	287.199	-69.949	82.520	7.809	14.592
78.	-18.226	287.971	-69.935	82.329	8.107	15.283
79.	-18.100	288.735	-69.921	82.137	8.402	15.968
80.	-17.971	289.492	-69.906	81.944	8.693	16.649
81.	-17.838	290.240	-69.891	81.751	8.981	17.325
82.	-17.703	290.980	-69.874	81.558	9.266	17.995
83.	-17.564	291.713	-69.858	81.365	9.548	18.661
84.	-17.422	292.438	-69.840	81.171	9.827	19.322
85.	-17.278	293.155	-69.822	80.977	10.102	19.978
86.	-17.130	293.864	-69.804	80.782	10.375	20.629
87.	-16.980	294.566	-69.784	80.587	10.644	21.276
88.	-16.828	295.260	-69.765	80.392	10.910	21.918
89.	-16.673	295.947	-69.744	80.196	11.173	22.556
90.	-16.515	296.627	-69.723	79.999	11.434	23.189
91.	-16.355	297.299	-69.701	79.802	11.691	23.817
92.	-16.193	297.964	-69.678	79.605	11.945	24.442
93.	-16.029	298.622	-69.655	79.408	12.196	25.062
94.	-15.862	299.273	-69.631	79.209	12.444	25.678
95.	-15.694	299.917	-69.607	79.011	12.690	26.289
96.	-15.523	300.554	-69.582	78.812	12.932	26.897
97.	-15.351	301.184	-69.556	78.612	13.172	27.500
98.	-15.177	301.807	-69.529	78.412	13.409	28.100
99.	-15.000	302.424	-69.502	78.211	13.643	28.695
100.	-14.823	303.035	-69.474	78.010	13.874	29.287
101.	-14.643	303.638	-69.445	77.809	14.103	29.875
102.	-14.462	304.236	-69.416	77.606	14.328	30.459
103.	-14.279	304.827	-69.385	77.404	14.552	31.039
104.	-14.095	305.412	-69.354	77.201	14.772	31.615
105.	-13.909	305.990	-69.323	76.997	14.990	32.188
106.	-13.722	306.563	-69.290	76.792	15.206	32.758
107.	-13.533	307.129	-69.257	76.588	15.418	33.323
108.	-13.343	307.690	-69.223	76.382	15.629	33.886
109.	-13.152	308.245	-69.188	76.176	15.837	34.444
110.	-12.959	308.793	-69.152	75.969	16.042	35.000
111.	-12.765	309.337	-69.116	75.762	16.245	35.552
112.	-12.570	309.874	-69.079	75.554	16.446	36.100
113.	-12.374	310.406	-69.040	75.346	16.644	36.646
114.	-12.176	310.932	-69.001	75.136	16.840	37.188
115.	-11.977	311.453	-68.962	74.927	17.034	37.727
116.	-11.778	311.969	-68.921	74.716	17.225	38.262
117.	-11.577	312.479	-68.879	74.505	17.414	38.795

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-8 CIDA #1 Spacecraft Attitude [EME'2000] (cont)

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
118.	-11.375	312.984	-68.837	74.294	17.601	39.325
119.	-11.172	313.484	-68.793	74.081	17.786	39.851
120.	-10.968	313.979	-68.749	73.868	17.969	40.375
121.	-10.763	314.468	-68.704	73.654	18.150	40.895
122.	-10.557	314.953	-68.657	73.440	18.329	41.413
123.	-10.350	315.432	-68.610	73.225	18.505	41.928
124.	-10.142	315.907	-68.562	73.009	18.680	42.440
125.	-9.933	316.377	-68.513	72.792	18.853	42.949
126.	-9.723	316.842	-68.462	72.575	19.023	43.455
127.	-9.513	317.303	-68.411	72.357	19.192	43.959
128.	-9.301	317.759	-68.359	72.138	19.360	44.460
129.	-9.088	318.210	-68.305	71.918	19.525	44.958
130.	-8.875	318.657	-68.251	71.698	19.688	45.454
131.	-8.660	319.099	-68.195	71.477	19.850	45.947
132.	-8.445	319.537	-68.138	71.255	20.010	46.438
133.	-8.228	319.970	-68.080	71.032	20.168	46.926
134.	-8.011	320.399	-68.021	70.808	20.325	47.411
135.	-7.793	320.824	-67.961	70.584	20.480	47.894
136.	-7.574	321.245	-67.899	70.359	20.634	48.375
137.	-7.354	321.661	-67.836	70.133	20.786	48.853
138.	-7.133	322.073	-67.772	69.906	20.936	49.329
139.	-6.911	322.481	-67.707	69.678	21.085	49.802
140.	-6.689	322.885	-67.640	69.450	21.232	50.274
141.	-6.465	323.285	-67.572	69.220	21.378	50.742
142.	-6.240	323.681	-67.503	68.990	21.523	51.209
143.	-6.015	324.073	-67.432	68.759	21.666	51.674
144.	-5.788	324.461	-67.360	68.527	21.808	52.136

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-9 CIDA #2 Spacecraft Attitude [EME'2000]

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
768.	-17.522	252.715	-70.458	99.908	-8.382	345.382
769.	-17.572	253.062	-70.474	99.805	-8.243	345.692
770.	-17.622	253.405	-70.491	99.702	-8.106	345.998
771.	-17.670	253.745	-70.506	99.599	-7.970	346.301
772.	-17.716	254.081	-70.522	99.497	-7.835	346.600
773.	-17.762	254.414	-70.537	99.394	-7.701	346.896
774.	-17.806	254.743	-70.552	99.291	-7.568	347.189
775.	-17.849	255.069	-70.567	99.188	-7.435	347.478
776.	-17.891	255.392	-70.581	99.084	-7.304	347.763
777.	-17.931	255.711	-70.595	98.981	-7.174	348.046
778.	-17.971	256.027	-70.609	98.878	-7.045	348.325
779.	(2) -18.043	256.621	-70.622	98.775	-6.832	348.858
780.	-18.130	257.366	-70.636	98.672	-6.574	349.529
781.	-18.213	258.105	-70.648	98.568	-6.318	350.192
782.	-18.292	258.836	-70.661	98.465	-6.063	350.848
783.	-18.366	259.561	-70.674	98.361	-5.809	351.497
784.	-18.437	260.280	-70.686	98.258	-5.557	352.139
785.	-18.503	260.992	-70.698	98.154	-5.307	352.774
786.	-18.565	261.698	-70.709	98.050	-5.058	353.401
787.	-18.623	262.397	-70.721	97.946	-4.811	354.022
788.	-18.678	263.090	-70.732	97.843	-4.566	354.637
789.	-18.729	263.777	-70.743	97.739	-4.322	355.245
790.	-18.776	264.457	-70.753	97.634	-4.080	355.846
791.	-18.819	265.131	-70.764	97.530	-3.840	356.441
792.	-18.860	265.799	-70.774	97.426	-3.601	357.030
793.	-18.896	266.460	-70.784	97.322	-3.364	357.613
794.	-18.930	267.116	-70.794	97.217	-3.129	358.190
795.	-18.960	267.766	-70.803	97.113	-2.895	358.761
796.	-18.987	268.409	-70.813	97.008	-2.663	359.326
797.	-19.011	269.047	-70.822	96.903	-2.433	359.886
798.	-19.032	269.679	-70.831	96.799	-2.205	0.440
799.	-19.050	270.305	-70.839	96.694	-1.978	0.988
800.	-19.066	270.925	-70.848	96.588	-1.754	1.531
801.	-19.078	271.540	-70.856	96.483	-1.530	2.069
802.	-19.088	272.149	-70.864	96.378	-1.309	2.602
803.	-19.095	272.752	-70.872	96.272	-1.090	3.129
804.	-19.099	273.350	-70.879	96.167	-0.872	3.652
805.	-19.101	273.942	-70.887	96.061	-0.656	4.169
806.	-19.100	274.529	-70.894	95.955	-0.441	4.682
807.	-19.097	275.110	-70.901	95.849	-0.229	5.189
808.	-19.092	275.686	-70.908	95.743	-0.018	5.692
809.	-19.084	276.257	-70.915	95.637	0.192	6.191
810.	-19.074	276.823	-70.921	95.530	0.399	6.685
811.	-19.062	277.383	-70.927	95.424	0.605	7.174
812.	-19.048	277.939	-70.933	95.317	0.809	7.659
813.	-19.032	278.489	-70.939	95.210	1.012	8.140
814.	-19.013	279.035	-70.945	95.103	1.213	8.617
815.	-18.993	279.575	-70.950	94.996	1.412	9.089
816.	-18.971	280.111	-70.956	94.889	1.609	9.557
817.	-18.947	280.641	-70.961	94.781	1.805	10.022
818.	-18.921	281.167	-70.966	94.673	2.000	10.482
819.	-18.893	281.689	-70.971	94.565	2.192	10.938
820.	-18.863	282.205	-70.975	94.457	2.384	11.390
821.	-18.832	282.717	-70.980	94.349	2.573	11.839
822.	-18.799	283.225	-70.984	94.240	2.761	12.284
823.	-18.765	283.728	-70.988	94.131	2.947	12.725
824.	-18.729	284.226	-70.992	94.023	3.132	13.163
825.	-18.691	284.720	-70.996	93.913	3.316	13.597
826.	-18.652	285.210	-70.999	93.804	3.498	14.028
827.	-18.611	285.696	-71.002	93.694	3.678	14.455
828.	-18.569	286.177	-71.006	93.585	3.857	14.879
829.	-18.526	286.654	-71.009	93.475	4.034	15.300
830.	-18.481	287.127	-71.012	93.364	4.210	15.717
831.	-18.435	287.595	-71.014	93.254	4.385	16.131
832.	-18.387	288.060	-71.017	93.143	4.558	16.542
833.	-18.339	288.521	-71.019	93.032	4.729	16.950
834.	-18.289	288.978	-71.021	92.921	4.899	17.354
835.	-18.237	289.431	-71.023	92.810	5.068	17.756
836.	-18.185	289.880	-71.025	92.698	5.236	18.155
837.	-18.132	290.325	-71.027	92.586	5.402	18.550
838.	-18.077	290.766	-71.028	92.474	5.567	18.943
839.	-18.021	291.204	-71.029	92.361	5.730	19.333
840.	-17.965	291.638	-71.031	92.249	5.892	19.720

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-9 CIDA #2 Spacecraft Attitude [EME'2000] (cont)

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
841.	-17.907	292.068	-71.031	92.136	6.053	20.105
842.	-17.848	292.495	-71.032	92.022	6.212	20.487
843.	-17.788	292.918	-71.033	91.909	6.371	20.866
844.	-17.727	293.338	-71.033	91.795	6.528	21.242
845.	-17.666	293.755	-71.034	91.681	6.683	21.616
846.	-17.603	294.167	-71.034	91.566	6.838	21.987
847.	-17.539	294.577	-71.034	91.452	6.991	22.356
848.	-17.475	294.983	-71.033	91.337	7.143	22.722
849.	-17.410	295.386	-71.033	91.221	7.294	23.086
850.	-17.343	295.786	-71.033	91.106	7.443	23.447
851.	-17.276	296.182	-71.032	90.990	7.592	23.806
852.	-17.209	296.575	-71.031	90.873	7.739	24.163
853.	-17.140	296.965	-71.030	90.757	7.885	24.517
854.	-17.071	297.352	-71.029	90.640	8.030	24.869
855.	-17.001	297.736	-71.027	90.522	8.174	25.219
856.	-16.930	298.117	-71.026	90.405	8.317	25.567
857.	-16.858	298.495	-71.024	90.287	8.459	25.912
858.	-16.786	298.870	-71.022	90.168	8.600	26.256
859.	-16.713	299.242	-71.020	90.050	8.739	26.597
860.	-16.639	299.611	-71.017	89.931	8.878	26.936
861.	-16.565	299.978	-71.015	89.811	9.015	27.273
862.	-16.490	300.341	-71.012	89.692	9.152	27.608
863.	-16.414	300.702	-71.009	89.571	9.287	27.941
864.	-16.338	301.060	-71.006	89.451	9.421	28.272
865.	-16.261	301.415	-71.003	89.330	9.555	28.601
866.	-16.184	301.768	-71.000	89.209	9.687	28.928
867.	-16.105	302.118	-70.996	89.087	9.819	29.253
868.	-16.027	302.465	-70.993	88.965	9.949	29.577
869.	-15.948	302.810	-70.989	88.843	10.079	29.898
870.	-15.868	303.152	-70.985	88.720	10.207	30.218
871.	-15.787	303.491	-70.980	88.596	10.335	30.536
872.	-15.707	303.828	-70.976	88.473	10.462	30.852
873.	-15.625	304.163	-70.971	88.349	10.588	31.166
874.	-15.543	304.495	-70.966	88.224	10.713	31.479
875.	-15.461	304.825	-70.961	88.099	10.837	31.790
876.	-15.378	305.152	-70.956	87.974	10.960	32.099
877.	-15.295	305.477	-70.950	87.848	11.082	32.407
878.	-15.211	305.800	-70.945	87.722	11.204	32.713
879.	-15.126	306.120	-70.939	87.595	11.324	33.017
880.	-15.041	306.438	-70.933	87.468	11.444	33.320
881.	-14.956	306.754	-70.927	87.340	11.563	33.621
882.	-14.870	307.068	-70.920	87.212	11.681	33.921
883.	-14.784	307.379	-70.914	87.083	11.799	34.219
884.	-14.697	307.688	-70.907	86.954	11.915	34.515
885.	-14.610	307.995	-70.900	86.825	12.031	34.810
886.	-14.522	308.300	-70.893	86.695	12.146	35.104
887.	-14.434	308.603	-70.885	86.564	12.261	35.396
888.	-14.346	308.903	-70.877	86.433	12.374	35.687
889.	-14.257	309.202	-70.870	86.302	12.487	35.976
890.	-14.168	309.499	-70.861	86.170	12.599	36.264
891.	-14.078	309.793	-70.853	86.037	12.710	36.551
892.	-13.988	310.086	-70.845	85.904	12.821	36.836
893.	-13.898	310.376	-70.836	85.771	12.931	37.120
894.	-13.807	310.665	-70.827	85.637	13.040	37.402
895.	-13.715	310.952	-70.818	85.502	13.149	37.683
896.	-13.624	311.236	-70.808	85.367	13.257	37.963
897.	-13.532	311.519	-70.798	85.231	13.364	38.242
898.	-13.439	311.800	-70.789	85.095	13.470	38.519
899.	-13.346	312.079	-70.778	84.958	13.576	38.795
900.	-13.253	312.356	-70.768	84.821	13.681	39.070
901.	-13.160	312.632	-70.757	84.683	13.786	39.343
902.	-13.066	312.906	-70.747	84.544	13.890	39.616
903.	-12.971	313.177	-70.735	84.405	13.993	39.887
904.	-12.877	313.448	-70.724	84.265	14.096	40.157
905.	-12.781	313.716	-70.712	84.125	14.198	40.426
906.	-12.686	313.983	-70.701	83.984	14.300	40.693
907.	-12.590	314.247	-70.688	83.843	14.401	40.960
908.	-12.494	314.511	-70.676	83.700	14.501	41.225
909.	-12.397	314.772	-70.663	83.558	14.601	41.490
910.	-12.300	315.032	-70.650	83.414	14.700	41.753
911.	-12.203	315.290	-70.637	83.270	14.799	42.015
912.	-12.105	315.547	-70.624	83.126	14.897	42.276
913.	-12.007	315.802	-70.610	82.981	14.995	42.536

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-10 CIDA #3 Spacecraft Attitude [EME'2000]

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
1702.	-18.287	258.777	-70.650	98.547	-6.109	350.804
1703.	-18.363	259.507	-70.662	98.443	-5.853	351.458
1704.	-18.434	260.232	-70.675	98.339	-5.600	352.104
1705.	-18.502	260.950	-70.687	98.235	-5.347	352.744
1706.	-18.565	261.661	-70.698	98.131	-5.097	353.377
1707.	-18.624	262.366	-70.710	98.026	-4.848	354.004
1708.	-18.680	263.064	-70.721	97.922	-4.600	354.623
1709.	-18.732	263.756	-70.732	97.818	-4.355	355.236
1710.	-18.780	264.442	-70.743	97.713	-4.110	355.842
1711.	-18.824	265.122	-70.753	97.608	-3.868	356.443
1712.	-18.865	265.795	-70.763	97.504	-3.627	357.037
1713.	-18.903	266.463	-70.773	97.399	-3.389	357.624
1714.	-18.937	267.124	-70.783	97.294	-3.151	358.206
1715.	-18.968	267.779	-70.792	97.189	-2.916	358.782
1716.	-18.995	268.428	-70.802	97.084	-2.682	359.352
1717.	-19.020	269.071	-70.811	96.979	-2.450	359.916
1718.	-19.041	269.709	-70.820	96.873	-2.220	0.475
1719.	-19.060	270.340	-70.828	96.768	-1.991	1.028
1720.	-19.075	270.966	-70.837	96.662	-1.765	1.576
1721.	-19.088	271.586	-70.845	96.556	-1.540	2.119
1722.	-19.098	272.200	-70.853	96.450	-1.316	2.656
1723.	-19.105	272.809	-70.861	96.344	-1.095	3.188
1724.	-19.110	273.412	-70.869	96.238	-0.875	3.715
1725.	-19.112	274.010	-70.876	96.132	-0.657	4.237
1726.	-19.111	274.602	-70.883	96.026	-0.441	4.754
1727.	-19.108	275.188	-70.890	95.919	-0.226	5.267
1728.	-19.103	275.770	-70.897	95.812	-0.013	5.774
1729.	-19.095	276.346	-70.904	95.705	0.198	6.277
1730.	-19.085	276.917	-70.910	95.598	0.407	6.776
1731.	-19.073	277.482	-70.916	95.491	0.615	7.270
1732.	-19.059	278.043	-70.922	95.384	0.821	7.759
1733.	-19.042	278.598	-70.928	95.276	1.026	8.244
1734.	-19.024	279.149	-70.934	95.168	1.228	8.725
1735.	-19.003	279.694	-70.939	95.061	1.429	9.202
1736.	-18.980	280.235	-70.944	94.953	1.629	9.674
1737.	-18.956	280.770	-70.949	94.844	1.826	10.143
1738.	-18.930	281.301	-70.954	94.736	2.023	10.607
1739.	-18.901	281.828	-70.959	94.627	2.217	11.068
1740.	-18.871	282.349	-70.964	94.518	2.410	11.525
1741.	-18.840	282.866	-70.968	94.409	2.601	11.978
1742.	-18.806	283.378	-70.972	94.300	2.791	12.427
1743.	-18.771	283.886	-70.976	94.191	2.979	12.872
1744.	-18.735	284.389	-70.980	94.081	3.166	13.314
1745.	-18.696	284.888	-70.984	93.971	3.351	13.752
1746.	-18.657	285.382	-70.987	93.861	3.535	14.187

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-11 CIDA #3 Solar Conjunction Characteristics

TFL (days) (1)	impact velocity (km/s)	+z-off sun (deg)	+z-off earth (deg)	+y-off SEP-N (deg)	+y-off orbit-N (deg)	+x-off ISP (deg)	fov exposure
1657.	58.572	1.608	1.988	96.536	177.533	0.000	0.766
1658.	58.583	0.993	1.540	99.367	177.534	0.000	0.766
1659.	58.588	0.381	1.194	101.808	177.535	0.000	0.766
1660.	58.589	0.225	1.054	103.886	177.535	0.000	0.766
1661.	58.585	0.826	1.195	105.631	177.534	0.000	0.766
1662.	58.576	1.423	1.541	107.072	177.533	0.000	0.766
1663.	58.562	2.015	1.988	108.233	177.532	0.000	0.766
1664.	58.545	2.601	2.481	109.138	177.530	0.000	0.766
1665.	58.522	3.183	2.998	109.808	177.528	0.000	0.766
1666.	58.496	3.760	3.528	110.259	177.526	0.000	0.766
1667.	58.466	4.332	4.065	110.507	177.522	0.000	0.766
1668.	58.431	4.899	4.607	110.563	177.519	0.000	0.766
1669.	58.393	5.460	5.152	110.437	177.515	0.000	0.766
1670.	58.351	6.017	5.699	110.137	177.511	0.000	0.766
1671.	58.306	6.569	6.248	109.668	177.506	0.000	0.766
1672.	58.257	7.116	6.797	109.037	177.501	0.000	0.766
1673.	58.204	7.658	7.347	108.245	177.496	0.000	0.766
1674.	58.149	8.195	7.897	107.296	177.490	0.000	0.766
1675.	58.090	8.727	8.447	106.191	177.484	0.000	0.766
1676.	58.028	9.254	8.997	104.932	177.478	0.000	0.766
1677.	57.963	9.776	9.547	103.520	177.471	0.000	0.766
1678.	57.895	10.294	10.097	101.958	177.464	0.000	0.766
1679.	57.825	10.806	10.646	100.247	177.457	0.000	0.766
1680.	57.752	11.314	11.194	98.390	177.449	0.000	0.766
1681.	57.676	11.817	11.743	96.391	177.441	0.000	0.766
1682.	57.598	12.315	12.290	85.742	177.433	0.000	0.766
1683.	57.517	12.808	12.837	88.004	177.425	0.000	0.766
1684.	57.435	13.297	13.383	90.384	177.416	0.000	0.766
1685.	57.350	13.781	13.929	92.870	177.407	0.000	0.766
1686.	57.263	14.260	14.473	95.449	177.397	0.000	0.766
1687.	57.174	14.735	15.017	98.104	177.388	0.000	0.766
1688.	57.083	15.206	15.560	100.819	177.378	0.000	0.766
1689.	56.990	15.671	16.103	103.575	177.368	0.000	0.766
1690.	56.895	16.133	16.644	106.352	177.357	0.000	0.766
1691.	56.799	16.590	17.184	109.131	177.347	0.000	0.766
1692.	56.701	17.042	17.723	111.893	177.336	0.000	0.766
1693.	56.602	17.490	18.261	114.619	177.324	0.000	0.766
1694.	56.501	17.934	18.799	117.295	177.313	0.000	0.766
1695.	56.399	18.374	19.335	119.906	177.301	0.000	0.766
1696.	56.295	18.810	19.870	122.441	177.289	0.000	0.766
1697.	56.191	19.241	20.403	124.890	177.277	0.000	0.766
1698.	(2) 56.085	20.000	21.266	127.247	177.265	0.332	0.762
1699.	55.977	20.000	21.376	129.507	177.252	0.092	0.765
1700.	55.869	20.000	21.488	131.667	177.240	0.511	0.760
1701.	55.760	20.000	21.602	133.726	177.227	0.926	0.756
1702.	55.650	20.000	21.719	135.685	177.213	1.338	0.751

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-12 CIDA #3 Solar Conjunction Spacecraft Attitude [EME'2000]

TFL (days) (1)	i-LAT (deg)	i-LNG (deg)	j-LAT (deg)	j-LNG (deg)	k-LAT (deg)	k-LNG (deg)
1657.	-15.117	240.188	-69.736	103.158	-13.174	333.813
1658.	-15.224	240.645	-69.766	103.057	-13.007	334.249
1659.	-15.328	241.099	-69.796	102.957	-12.842	334.681
1660.	-15.431	241.550	-69.825	102.856	-12.677	335.110
1661.	-15.531	241.998	-69.853	102.755	-12.512	335.534
1662.	-15.629	242.443	-69.881	102.653	-12.348	335.954
1663.	-15.725	242.884	-69.908	102.552	-12.185	336.370
1664.	-15.819	243.323	-69.935	102.451	-12.023	336.782
1665.	-15.912	243.758	-69.962	102.349	-11.861	337.190
1666.	-16.002	244.189	-69.988	102.248	-11.700	337.594
1667.	-16.090	244.617	-70.013	102.146	-11.540	337.994
1668.	-16.176	245.042	-70.038	102.044	-11.381	338.389
1669.	-16.261	245.463	-70.062	101.942	-11.223	338.781
1670.	-16.343	245.881	-70.086	101.840	-11.065	339.169
1671.	-16.424	246.295	-70.109	101.738	-10.909	339.552
1672.	-16.502	246.706	-70.133	101.636	-10.753	339.931
1673.	-16.579	247.113	-70.155	101.534	-10.598	340.307
1674.	-16.654	247.517	-70.177	101.432	-10.444	340.678
1675.	-16.727	247.917	-70.199	101.330	-10.291	341.045
1676.	-16.799	248.313	-70.220	101.227	-10.139	341.408
1677.	-16.869	248.706	-70.241	101.125	-9.988	341.767
1678.	-16.937	249.095	-70.262	101.022	-9.838	342.122
1679.	-17.003	249.481	-70.282	100.920	-9.689	342.473
1680.	-17.068	249.862	-70.301	100.817	-9.540	342.820
1681.	-17.131	250.241	-70.321	100.715	-9.393	343.164
1682.	-17.193	250.615	-70.340	100.612	-9.247	343.503
1683.	-17.253	250.987	-70.358	100.509	-9.102	343.838
1684.	-17.311	251.354	-70.377	100.407	-8.957	344.170
1685.	-17.368	251.718	-70.395	100.304	-8.814	344.498
1686.	-17.424	252.078	-70.412	100.201	-8.672	344.822
1687.	-17.478	252.435	-70.429	100.098	-8.530	345.142
1688.	-17.530	252.789	-70.446	99.995	-8.390	345.459
1689.	-17.582	253.138	-70.463	99.892	-8.251	345.772
1690.	-17.631	253.485	-70.479	99.789	-8.113	346.081
1691.	-17.680	253.828	-70.495	99.686	-7.975	346.387
1692.	-17.727	254.167	-70.510	99.582	-7.839	346.690
1693.	-17.773	254.503	-70.526	99.479	-7.704	346.988
1694.	-17.818	254.836	-70.541	99.376	-7.569	347.284
1695.	-17.861	255.165	-70.555	99.272	-7.436	347.575
1696.	-17.903	255.491	-70.570	99.169	-7.304	347.864
1697.	-17.944	255.814	-70.584	99.065	-7.172	348.149
1698. (2)	-17.941	255.787	-70.598	98.962	-7.145	348.113
1699.	-18.034	256.545	-70.611	98.858	-6.884	348.797
1700.	-18.123	257.295	-70.624	98.755	-6.624	349.473
1701.	-18.208	258.039	-70.637	98.651	-6.365	350.142
1702.	-18.287	258.777	-70.650	98.547	-6.109	350.804

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

## **4.0 Additional Mission Plan MCRs**



# MSOP CHANGE REQUEST

Mission Change Request # 579 rev a  
 Sequence Change Request # \_\_\_\_\_  
 Command Change Request # \_\_\_\_\_

**Title** Mission Plan Post Launch Supplement A (Keywords)

S/C Affected:  
 MGS  SD  
 MSÖ98O  MSÖ98L

Initiator: E. Hirst Phone: 818 354 4947 Date: 01 Dec 1999 Type of Change: (n/a for CMD) <input type="checkbox"/> Hardware - NASA ID: _____ H/W Location: _____ <input type="checkbox"/> Software <input checked="" type="checkbox"/> Documentation <input type="checkbox"/> Sequence # _____ Priority: <input type="checkbox"/> 1. No workaround exists <input checked="" type="checkbox"/> 2. Arduous workaround exists <input type="checkbox"/> 3. Acceptable workaround exists <input type="checkbox"/> 4. Desirable	Teams Affected by this Request: <input type="checkbox"/> GDS <input checked="" type="checkbox"/> MP&S <input checked="" type="checkbox"/> Science <input checked="" type="checkbox"/> SCT <input type="checkbox"/> TMOD <input checked="" type="checkbox"/> NAV <input type="checkbox"/> Facilities	Subsystems/Components Affected:  Related: (n/a for CMD)
	Implementation Required by: ASAP	
	Documents Affected: (n/a for CMD)  Mission Plan Design Reference Mission Navigation Plan	

**Change Requested:**

This supplement (attachment 1) documents post-launch updates to information that is key in the implementation of the Stardust Mission Plan. The update is required as a result of having launched on the second day of the Stardust launch period, 02/07/99. Mission Plans described in the Mission Plan document... (continued next page)

**Reason for Change/Command:**

Bring documentation up to date given the actual launch date and operations trajectory.

**Impact if not implemented:**

Approximately 20 m/s to not move DSM-1. Missed opportunity for increasing ISP collection by 16-28 days. Mission Plan schedules off by 1 day and/or inconsistent with operations trajectory.

**Implementation Approach:**

Publish Mission Plan Supplement document. Allow flow down of new plans to subsystems.

Approved  Rejected  
 Authorized by: **MCCB** Tom Duxbury Date: 12/16/99

Approximate Cost Estimate: W/F _____ \$ _____  Mission Phase No.: _____ ICA: _____ Date Implemented: Closed Date:	Comments:  Modification of the Mission Plan to reflect the change in DSM#1 is also approved.
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10/29/96  
JAB



# MSOP CHANGE REQUEST

Mission Change Request # ???  
Sequence Change Request #         
Command Change Request #       

S/C Affected:

**Title** Mission Plan Post Launch Supplement A (Keywords)  MGS  SD  
 MSÖ98O  MSÖ98L

## Change Requested (cont):

(SD-75000-100-Rev. A, 02/01/99) are applicable to launching on the first day of the launch period, 02/06/99. The supplement also provides updates to detailed ISP collection and CIDA experiment spacecraft attitude data, making them consistent with the latest operations ephemeris: SDU\_L\_991117\_990207\_060401.

Two major changes to the Stardust Mission Plan are reflected in this supplement:

1. Location of Deep Space Maneuver #1: The location of this maneuver is shifted earlier by 52 days, from 03/10/2000 to 01/18/2000. This location minimizes the delta-V cost of the mission.
2. Earlier start to Interstellar Dust Collection Period #1: Earlier execution of DSM1 allows for an earlier start to the first ISP collection period. The start of collection moves 16-28 days earlier, from 03/15/2000 to 02/16-28/2000. The total duration of dust collection is increased by the same amount, corresponding to a full grid increase of the same amount.

The detailed changes included in this supplement are described below:

### 2.0 Post Launch Figure Updates

#### Figure

Figure 2.3-1 STARDUST (E-E-W2-E) Heliocentric Trajectory  
Figure 2.3-2 STARDUST Mission Overview (1999-2006)

#### Change

launch date, date of DSM-1, start of ISP-1  
launch date, date of DSM-1, start of ISP-1, TFL\* reference  
TCM-3 placed post solar conjunction  
DSM-3 moved 4 days earlier to avoid July 4 holidays  
DSM-4 moved 1 day later to avoid Sunday  
modified DSN schedule to reflect modified DSM schedules  
depicts characteristics of earlier start of ISP-1  
depicts characteristics of earlier start of ISP-1

Figure 4.2-1 Profile of ISP Collection Experiment - Loop 1  
Figure 4.2-2 ISP Impact Velocity History (b=1 particle)  
Figure 4.2-3.a. Spacecraft +z-axis Off-sun and Off-Earth Angle History  
Figure 4.2-3.b. Spacecraft +y-axis Yaw Angle History  
Figure 4.2-4.a. Collector Deployment Angle and Grid Exposure History  
Figure 4.2-4.b. Beta Meteoroid Impact Angle

### 3.0 Post Launch Table Updates

#### Table

Table 2.3-1 STARDUST Mission Phases  
Table 2.3-2 Baseline Mission Parameters vs. Launch Date  
Table 4.1-1 Cruise Phase Subphase Definition  
Table 4.2-1.a Interstellar Particle Collection Subphases  
Table 4.2-2 Interstellar Particle Related CIDA Experiment Periods  
Table 4.3-1.a Cruise Phase Mission Operations  
Table 4.3-1.b Cruise Phase Mission Operations - DSN Profile  
Table 4.3-1.c Cruise Phase Mission Operations - Spacecraft Attitude  
Table 5.1-1 Earth Gravity Assist Phase Subphase Definition  
Table 5.2-1 Earth Gravity Assist Phase Mission Operations  
Table 6.1-1 Wild-2 Encounter Phase Subphase Definition  
Table 6.3-1 Wild-2 Encounter Phase Mission Operations  
Table 7.1-1 Earth Return Phase Subphase Definition  
Table 7.3-1 Earth Return Phase Mission Operations  
Table 10.1-3 Spacecraft Attitude Profile - Limit Cycle Model  
Table 10.2-5 Spacecraft Attitude Profile - Slew dV Model  
Table 10.2-6 Communications Schedules  
Table 11-1 Event Listing  
Table 11-2 Time Ordered Event Listing

#### Change

TFL references  
reflects characteristics of current operations trajectory  
TFL references, DSM/TCM schedule, ISP schedule  
Earlier start to ISP-1, TFL references  
TFL references, except CIDA-1  
DSM/TCM schedule, TFL references  
DSM/TCM schedules, TFL references  
ISP schedule, TFL references  
ISP schedule, TFL references, remove duplicate entries  
ISP schedule, TFL references, remove duplicate entries  
DSM/TCM schedule, ISP schedule, TFL references  
update mission profile as per all above  
update mission profile as per all above

(continued next page)

TFL = time from launch



# MSOP CHANGE REQUEST

Mission Change Request # ???  
Sequence Change Request #         
Command Change Request #       

**Title** Mission Plan Post Launch Supplement A

(Keywords)

S/C Affected:

MGS     SD  
 MSÖ98O    MSÖ98L

**Change Requested (cont):**

3.0 Post Launch Table Updates (cont)

Table

- Table 12-1 ISP#1 Collection Period Characteristics
- Table 12-2 ISP#2 Collection Period Characteristics
- Table 12-3 ISP #1 Spacecraft Attitude [EMEÖ2000]
- Table 12-4 ISP#2 Spacecraft Attitude [EMEÖ2000]
- Table 12-5 CIDA#1 Collection Period Characteristics
- Table 12-6 CIDA#2 Collection Period Characteristics
- Table 12-7 CIDA#3 Collection Period Characteristics
- Table 12-8 CIDA#1 Spacecraft Attitude [EMEÖ2000]
- Table 12-9 CIDA#2 Spacecraft Attitude [EMEÖ2000]
- Table 12-10 CIDA#3 Spacecraft Attitude [EMEÖ2000]
- Table 12-11 CIDA#3 Solar Conjunction Characteristics
- Table 12-12 CIDA#3 Solar Conjunction Spacecraft Attitude [EMEÖ2000]

Change

- earlier start to ISP#1, TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- earlier start to ISP#1, TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory

TFL = time from launch



# MSOP CHANGE REQUEST

Mission Change Request # 612  
 Sequence Change Request # \_\_\_\_\_  
 Command Change Request # \_\_\_\_\_

**Title** Addition of TCM-A to Mission Plan (Keywords)

S/C Affected:  
 MGS  SD  
 MSÖ98O  MSÖ98L

Initiator: E. Hirst Phone: 818 354 4947 Date: 01 Dec 1999 <hr/> Type of Change: (n/a for CMD) <input type="checkbox"/> Hardware - NASA ID: _____ H/W Location: _____ <input type="checkbox"/> Software <input checked="" type="checkbox"/> Documentation <input checked="" type="checkbox"/> Sequence # <u>TCM-A Mini-sequence</u> <hr/> Priority: <input type="checkbox"/> 1. No workaround exists <input type="checkbox"/> 2. Arduous workaround exists <input checked="" type="checkbox"/> 3. Acceptable workaround exists <input type="checkbox"/> 4. Desirable	Teams Affected by this Request: <input type="checkbox"/> GDS <input checked="" type="checkbox"/> MP&S <input type="checkbox"/> Science <input checked="" type="checkbox"/> SCT <input checked="" type="checkbox"/> TMOD <input checked="" type="checkbox"/> NAV <input type="checkbox"/> Facilities <hr/> Implementation Required by: ASAP <hr/> Documents Affected: (n/a for CMD) none	Subsystems/Components Affected:  <hr/> Related: (n/a for CMD)
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**Change Requested:**

Addition of TCM-A to Mission Plan, to be executed on 28 December 1999. No change to Mission Plan documentation as planning is already in place.

**Reason for Change/Command:**

DSM-1, the largest maneuver of the mission at ~170 m/s, would have been the first trajectory correction maneuver given the cancellation of TCM-1. TCM-A provides the flight team with the opportunity to perform a first time event with significantly less impact to the mission should an anomaly occur.

**Impact if not implemented:**

Increased risk due to DSM-1 being the first trajectory correction maneuver of the mission.

**Implementation Approach:**

Document addition of TCM-A with this change request only. Implement 11 m/s burn on 28 December 1999.

Approved

Rejected

**MCCB**

Authorized by: Tom Duxbury

Date: 12/06/99

Approximate Cost Estimate:  
 W/F \_\_\_\_\_ \$ \_\_\_\_\_  
 Mission Phase No.: \_\_\_\_\_  
 ICA: \_\_\_\_\_  
 Date Implemented:  
 Closed Date:

Comments:

Modification of the Mission and Navigation Plans to reflect the Addition of TCM-A is also approved.